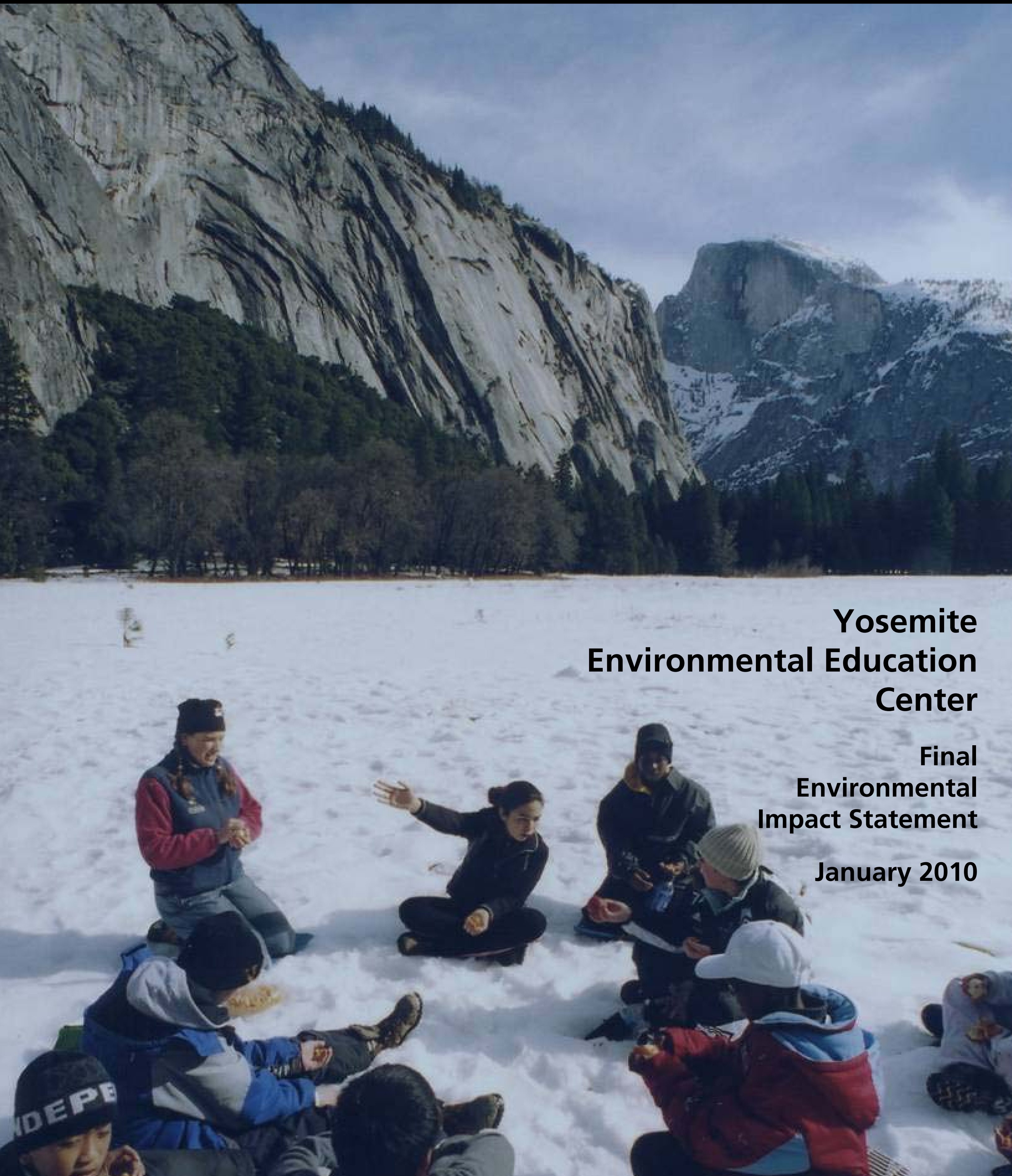
Yosemite National Park

National Park Service
U.S. Department of the Interior



Yosemite Environmental Education Center

Final Environmental Impact Statement

January 2010

United States Department of the Interior

NATIONAL PARK SERVICE
Yosemite National Park
P.O. Box 577
Yosemite, California 95389

IN REPLY REFER TO:
L7617 (YOSE-PM)

Dear Yosemite Friends:

I am pleased to provide the *Yosemite Environmental Education Center Final Environmental Impact Statement* (FEIS) for your review. The Yosemite Institute will partner with the National Park Service to operate the new Environmental Education Center. The Yosemite Institute is a nonprofit partner organization and has provided environmental education programs for children in Yosemite National Park since 1971.

The Yosemite Institute currently provides multi-day experiential programs at the Crane Flat campus under a cooperative agreement. These park facilities were not initially designed for educational purposes, therefore, improvements are needed to achieve modern standards and ensure resource protection. The National Park Service and the Yosemite Institute are partnering to create a green, energy-efficient campus in harmony with its natural surroundings and historic setting; where young people will find inspiration as our next generation of national park stewards.

The FEIS was developed in accordance with the National Environmental Policy Act and National Historic Preservation Act, Section 106, requirements. In 2002, Yosemite National Park conducted public scoping to solicit ideas and identify issues and concerns. Public, tribal, and agency participation has continued to be a key element in this ongoing planning effort. In May 2009, a *Draft Environmental Impact Statement* (DEIS) was released for a 60-day public review and the park received 47 public comment letters.

The FEIS describes two action alternatives as well as the No Action Alternative (maintain current management and operations) and presents an analysis of the potential impacts of each. Alternative 2 proposes redevelopment of the Crane Flat campus. Alternative 3 (preferred) proposes development of a new environmental education center at Henness Ridge and restoration of the Crane Flat campus site to provide habitat for sensitive species. Public comments received on the DEIS have been fully considered in the preparation of this final document.

Information about this project can be reviewed online at www.nps.gov/yose/parkmgmt/eecampus.htm. Following a 30-day no action period, the NPS will document a final decision in a Record of Decision, which will be published in the *Federal Register*.

Sincerely,

David V. Uberuaga

David V. Uberuaga
Acting Superintendent

Yosemite National Park

Lead Agency: National Park Service

ABSTRACT

The Yosemite Institute (YI), a National Park Service (NPS) non- profit park partner, has provided environmental education programs in Yosemite National Park since 1971. In 1973, YI began using the old CCC/NPS Blister Rust camp at Crane Flat for overnight programs and operations. YI also leads programs out of Curry Village in Yosemite Valley, and rotates students in and out of the two park areas throughout their week- long stay. Most of the Crane Flat campus structures and utilities are approaching 70 years old, are energy inefficient, and are increasingly difficult to retrofit to achieve modern standards for health, safety, and accessibility. Crane Flat campus currently provides overnight lodging for 76 students per night, while the remainder is housed in commercial lodging in Curry Village (now in adjacent Boystown) at a significantly higher cost. To address these issues, and provide a more suitable educational facility, YI and NPS are considering options to redevelop the existing campus or construct a new campus at a different location.

This Environmental Impact Statement (EIS) presents and analyzes three alternatives the agency is considering for public input and review, according to the National Environmental Policy Act (1969, as amended): Alternative 1—No- Action ; Alternative 2—Redevelop Crane Flat Campus; and Alternative 3 (Preferred)—Construct a new campus at Henness Ridge, and restore Crane Flat to natural conditions.

The park began public scoping for this project in 2002. Input received from the public, tribes, and other agencies has been welcomed and considered throughout the development of this EIS. Environmental studies and comments received on an administrative Draft EIS prepared in 2004 led to reconsideration and formulation of a new alternative, which would locate the campus in a new area of the park to avoid sensitive resources in and around Crane Flat meadows. After completion of further studies and analyses at both sites, a public review Draft EIS was released in May 2009. The park hosted several public review meetings, open houses, and site tours during the public review period. The Park received more than 40 comment letters on the Draft EIS, which have been reviewed and considered in this Final EIS. If approved in a Record of Decision, the preferred alternative, as outlined and presented in this EIS would guide construction of a new environmental education campus at Henness Ridge.

This document may also be reviewed online at www.nps.gov/yose/planning. Additional copies (specify hardcopy or CD) may also be requested on- line, or by phone, as noted below:

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EXECUTIVE SUMMARY

INTRODUCTION

Pursuant to Section 102(2) (C) of the National Environmental Policy Act of 1969 (Public Law [PL] 91- 190, as amended), and the Council on Environmental Quality (CEQ) Regulations (40 Code of Federal Regulations [CFR] Part 1500- 1508), the Department of the Interior, National Park Service (NPS), has prepared a Draft and Final Environmental Impact Statement (EIS) identifying and evaluating three alternatives for the Yosemite Institute (YI) environmental education campus in Yosemite National Park: This document also serves to meet the public review requirements of Section 106 of the National Historic Preservation Act and the California Environmental Quality Act (CEQA).

PURPOSE AND NEED FOR THE ACTION

For more than 35 years, the Yosemite Institute has partnered with the National Park Service to provide environmental education programs in Yosemite National Park. The YI campus at Crane Flat has served as an educational facility since 1973. The campus was assembled over time from older park structures not intentionally designed for educational purposes. Most of the structures and utilities are more than 60 years old, inefficient, and in need of costly repairs and upgrades to achieve modern standards for health, safety, and accessibility. In addition, the Crane Flat campus can accommodate only a fraction of the students enrolled in the program; the remainder (a majority) must be based elsewhere in the park in expensive commercial lodging that is secured through three- year agreements. As a result, long- term availability for student lodging is unreliable and the costs of the overall program are significantly higher because of this use of offsite lodging.

The purpose of the proposed action is to:

- Promote the development of future stewards for the environment and our national parks
- Provide an environmental education campus location and program that better serves the combined missions of the Yosemite Institute and Yosemite National Park
- Provide a safe and universally accessible campus facility that meets modern health and safety standards
- Provide a location conducive to multi- day experiential programs that complement California state educational standards and offer opportunities for research and study of the natural world
- Provide a campus facility that meets or exceeds national Leadership in Energy and Environmental Design (LEED) standards
- Create a campus design that better encourages responsible interaction with the environment
- Establish an ecologically sensitive campus that protects park resources and provides exemplary environmental educational learning opportunities

OVERVIEW OF THE ALTERNATIVES

Alternative 1: No Action

Under the No- Action Alternative (Alternative 1), there would be no change in the management direction, program, location, or conditions at the Crane Flat campus. Necessary maintenance and repairs would continue, but no major rehabilitation of facilities, construction of buildings, or improvements to utilities would occur. There would be no change in size of facilities—the number of student and staff beds (76 and 8, respectively) would remain the same. The overall number of students in the park per session would remain the same (390 students), with the majority of students in commercial lodging in Yosemite Valley.

Alternative 2: Crane Flat Redevelopment

Under Alternative 2, the Crane Flat campus would be redeveloped, doubling its capacity (to 154 students, 14 staff), and greatly reducing reliance upon commercial lodging in Yosemite Valley. Most campus buildings would be removed and replaced. Two historic properties, building numbers 6013 and 6017, would be retained, while two other historic properties, building numbers 6014 and 6015, would be removed. New sustainable, energy- efficient facilities would be constructed. Utilities would be upgraded to conserve water, meet additional capacity, and achieve health, safety, and accessibility standards. The new campus would be reconstructed largely in its existing location (shifting the campus cabins upslope, away from a sensitive meadow), with an expanded footprint, and would include approximately 34,575 square feet of space. The majority of the campus would be accessible to persons with disabilities under the Americans with Disabilities Act (ADA).

Alternative 3: Henness Ridge Center (Preferred)

Under Alternative 3, a new center would be developed at Henness Ridge in Yosemite National Park, and the campus at Crane Flat would be restored to natural conditions. At Henness Ridge, new facilities would be constructed to accommodate 224 students and 20 staff. Utilities would be installed at Henness Ridge, including water storage, wastewater treatment, electricity, a solar array, geothermal heat pump, propane tank, and an emergency generator. A new firehouse would also be integral to the campus. A new water treatment facility would be constructed at Chinquapin (concealed inside a historic garage), and delivered to the campus via the Wawona Road utility corridor. The outmoded water system on Old Glacier Point Road and Indian Creek would be removed (removing modern utility buildings, while retaining a historic water tank), the historic roadbed would be maintained but restored as a Wilderness trail (fulfilling a longstanding goal of converting these 64 acres to Wilderness, as approved by Congress in 1984). Electricity would be supplemented by tying into existing electric transmission lines. The new facilities would be universally - accessible and meet fire, health, and safety standards. The campus would include approximately 82,000 square feet of developed space.

In addition, under Alternative 3, Crane Flat campus would be restored to essentially natural conditions, and the site would revert from a development zone to a natural zone. Existing campus structures and facilities, including trailers, modern buildings, and several historic structures as well as the parking lot would be removed. Infrastructure such as the plumbing, electrical lines, septic system, and propane tanks would also be removed. The former campus site would be restored by loosening and preparing the soil (retaining and improving topsoil), and reseeding and planting with native materials. Wildlife habitat would also be improved with retention of large diameter woody debris, and meadow/wetland vegetation would be restored to improve hydrologic function. Social trails emanating from the former campus would be removed and restored.

ENVIRONMENTALLY PREFERABLE ALTERNATIVE

The CEQ Regulations and NPS policies on implementing NEPA require that "the alternative or alternatives which were considered to be environmentally preferable" be identified (CEQ Reg., Sec. 1505.2). Environmentally preferable is defined as "the alternative that will promote the national environmental policy as expressed in the NEPA Section 101. Ordinarily, this means the alternative that causes the least damage to the biological and physical environment; it also means the alternative that best protects, preserves, and enhances historic, cultural, and natural resources" (CEQ 1981).

Section 101 of NEPA states that "…it is the continuing responsibility of the Federal Government to…(1) fulfill the responsibilities of each generation as trustee of the environment for succeeding generations; (2) assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings; (3) attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences; (4) preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity, and variety of individual choice; (5) achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and (6) enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources." The environmentally preferable alternative for the YI environmental education campus is based on these national environmental policy goals.

Alternative 1, the No-Action Alternative, does not best achieve goals 2, 4, or 6. In regards to goal 2, the current campus could be much safer, more productive in terms of educational content and efficiency, and more aesthetically pleasing in terms of architectural design and layout. In regards to goal 4, the current campus environment does not preserve important natural features such as the fen and great gray owl populations. And finally, in regards to goal 6, the current campus does not enhance renewable resources but rather depends on technologies and resource use patterns developed nearly 40 years ago.

Alternative 2, when compared with the No-Action Alternative, better achieves goals 2 and 6 by creating a safer, more efficient campus that incorporates various green technologies and recycled materials. However, goal 4 is still not attained because impacts to important natural features, namely the fen and great gray owl populations, would continue.

Through analysis, Alternative 3, the Henness Ridge center, has been identified as the *environmentally preferred* alternative. Alternative 3 best achieves the six goals prescribed under Section 101 of NEPA. Alternative 3 would fulfill goal 1 by restoring to natural conditions (to the extent practicable) the existing Crane Flat site. Alternative 3 would fulfill goals 2 and 3 by reducing risks to public health and safety by removing structures and constructing new facilities that comply with current ADA and fire standards. Under Alternative 3, the fen system would be allowed to recover with no additional water removal, and the habitat for owls at Crane Flat would be protected when campus operations there cease and meadows are restored. Goals 4 and 5 would be attained under Alternative 3 by creating an educational environment that supports diversity and visitor enjoyment, and balances that use with resource protection and interpretation. In addition, under Alternative 3 Crane Flat would restore meadows used by American Indians in the region for traditional cultural practices such as plant gathering. Also, a 64-acre parcel of land near Henness Ridge along Indian Creek east of Wawona Road was previously evaluated for Wilderness and found suitable. Under Alternative 3, some impediments, namely water utility structures, would be removed and this parcel could become Wilderness.

Consistent with goal 6, Alternative 3 would implement sustainable technologies designed to minimize impacts on natural resources, as indicated in the National Park Service's *Guiding Principles of Sustainable Design*

(1993b). Sustainable principles and technologies incorporated into this alternative include use of recycled materials and installation of energy- and water- efficient features and utilities. Under Alternative 3, goal 6 would be even more fully realized as the new campus would utilize alternative energy sources including solar and geothermal which could attain annual net- zero energy use.

NPS- PREFERRED ALTERNATIVE

Several workshops and design charrettes that have included public participation have been held throughout this planning process to inform the designs and refine the alternatives. Initial scoping comments revealed much skepticism regarding the redevelopment of a campus at Crane Flat, due to substantial concerns regarding water resources and sensitive species. New development in the park has long been a controversial subject, and finding a site that would be suitable for an environmentally conscious campus became a primary goal of the National Park Service and the Yosemite Institute.

In September, 2008, the National Park Service held a Choosing by Advantage (CBA) workshop to identify a preferred alternative. More than 70 items pertaining to resources, operations, and sustainable design were ranked for how well they addressed the purpose and need, and were consistent with the combined missions of the Yosemite Institute and the National Park Service. National Park Service and YI staff applied their professional judgment to weigh the potential adverse and beneficial effects of each alternative. The Henness Ridge site (Alternative 3) was selected from among 11 different sites as best meeting the criteria mentioned above, allowing for creation of a more sustainable and efficient campus that could serve a greater number and diversity of students while reducing and avoiding impacts to sensitive resources. This Final EIS is designed to address these concerns in a thoughtful and thorough manner, and outlines the refined alternatives for public review.

SUMMARY OF THE ENVIRONMENTAL CONSEQUENCES

A summary of environmental impacts to resource topic by alternative follows. Mitigation measures for each are included in Chapter 2: Alternatives.

Alternative 1

Impacts to natural and socio- cultural resources under Alternative 1 are not expected to depart measurably from the current conditions. Impacts to natural resources under Alternative 1 would include continued compaction, trampling, and loss of topsoil and vegetation, groundwater pumping, some discharge of pollutants into surface water and groundwater, and disturbances to wetlands from student activities. In addition, wildlife and rare, threatened, and endangered species would continue to be affected by disturbances associated with human presence in the area as well as general habitat degradation. Impacts to the night sky, scenic resources, air quality, and the soundscape would continue to include impacts from light (slight glow) due to campus operations, some contrast to scenic resources from the existing facilities, changes in air quality from wood- burning stoves and vehicle admissions, and changes in the soundscape from human presence in the area. Energy use would also continue to be affected because wood- burning stoves are used to heat poorly insulated campus facilities. Wilderness characteristics would experience continued impacts from use of the areas for hiking, snowshoeing, and/or skiing.

No construction- or operation- related impacts would occur or affect archeological resources, American Indian Traditional Cultural Properties or practices, or land use. Socio- cultural resources that would experience impacts include continued effects to historic structures, buildings, and landscapes from visitor use and maintenance and repair of the structures. Park facilities and operation would be subject to disproportionate demands for repair and maintenance work, and transportation impacts would continue, such as the contribution of campus- related traffic on local roadways. Community values and socioeconomics would not be adversely affected beyond current conditions for such as demands on employment, local spending, or housing demand. Pursuant to NHPA Section 106 implementing regulations at 36 CFR Part 800, there would be no adverse effects to historic properties.

Alternative 2

In terms of natural resources, impacts to geology, geologic hazards, soils, and vegetation would include construction- related grading, leveling, trampling, and minor excavation, with long- term compaction of soil and possibly topsoil erosion due to vehicle and pedestrian use. Impacts to hydrology under Alternative 2 would include an increase in groundwater pumping to provide water to a redeveloped campus. Impacts to water quality would include construction- related stormwater runoff laden with sediment or pollutants from eroded soil, waste, or hazardous materials, an increase in impervious surfaces, and an increase in wastewater generation. Importantly, impacts to wetlands under Alternative 2 include long- term disturbance from water table decline from increased groundwater pumping.

Impacts to wildlife and rare, threatened, and endangered species under Alternative 2 would include construction- related noise and ground vibrations, noise from campus activities, artificial light, human presence, handling, automobile traffic, and other use- associated effects and loss of habitat. Like Alternative 1, impacts to the night sky would include a slight glow from campus operations. Impacts to scenic resources would include a temporary contrast from construction equipment, demolished buildings, and exposed soil, and a permanent contrast from new buildings and campus operations. Impacts to air quality would include temporary construction- related engine and dust emissions and increased vehicle emissions from more users traveling to and from the campus, while soundscape impacts would include noise from construction equipment, noise associated with construction- related traffic, human voices, noise associated with educational activities and student play, and vehicle noise as people enter and exit the campus. In terms of energy, impacts under Alternative 2 would include construction- related energy consumption of fuel, materials, and electricity, and increased energy consumption; however, the energy- efficient facilities would decrease per capita energy consumption at the campus. In terms of wilderness characteristics, impacts under Alternative 2 would include an increase in Wilderness use for campus activities such as hiking, snowshoeing, or skiing.

In terms of impacts to socio- cultural resources, no significant or adverse impacts to land use, archeological resources, or American Indian Traditional Cultural Properties and practices are anticipated. Construction- related impacts would include adverse effects to two historic properties (Buildings 6014 and 6015) (see Table 2- 10). The adverse effect would be resolved by implementing standard mitigation measures detailed in Chapter 3, which would result in no significant impact. In terms of impacts to visitor experience and recreation, Alternative 2 would include temporary suspension of recreational opportunities at the campus, increased number of students able to stay on campus, decreased use of offsite facilities, improved functionality of the campus, and reduced crowding. Alternative 2 would also result in demands on park facilities management staff to address traffic concerns during construction, increased campus- generated visitation to the park, decreased maintenance and repair work demands on facilities management staff, and increased fire protection for the campus. Similarly, impacts to transportation under Alternative 2 would include construction- related traffic for personnel, equipment, and materials, and increased campus users traveling to and from the site. Finally, Alternative 2 would affect the community values of El Portal, Foresta, and Yosemite West due to an increase in demands for staff housing as well as increased construction- related employment, regional and local spending, and a slight increase in housing demand.

Alternative 3

Impacts to the geology, geologic hazards, and soils of Henness Ridge under Alternative 3 would include construction- related grading, leveling, and minor excavation, with long- term compaction of soil and possibly topsoil erosion due to vehicle and pedestrian use. Impacts to Crane Flat under Alternative 3 would include demolition- related trenching with topsoil conservation and replacement, with long- term decompaction of soils and stabilization through revegetation. Impacts to the hydrology of Henness Ridge under Alternative 3 would include an increase in impervious surfaces but no measurable impact on the water table from groundwater pumping. Impacts to Crane Flat under Alternative 3 would include removal of impervious surfaces and the cessation of campus- related groundwater pumping, which may lead to a rise in the water table. Similarly, impacts to water quality at Henness Ridge under Alternative 3 would include construction- related stormwater runoff, an increase in the amount of impervious surfaces, and new wastewater generation. Impacts to Crane Flat under Alternative 3 would include removal of most impervious surfaces and cessation of campus- related wastewater generation.

There would be no impacts to wetlands at Henness Ridge under Alternative 3. Impacts to Crane Flat under Alternative 3 would include discontinuation of student activities and thus disturbance, removal of most impervious surfaces, and a cessation of campus- related groundwater pumping, allowing the water table to rebound and the fen to restore. Impacts to the vegetation at Henness Ridge under Alternative 3 would include vegetation removal, soil compaction, dust, root damage, erosion, collection, possible introduction of non-native species, and trampling. Impacts to Crane Flat under Alternative 3 would include the cessation of student disturbance of vegetation and the revegetation of most of the campus with appropriate native plant species. Under Alternative 3, impacts to Henness Ridge wildlife would include construction- related removal/loss of vegetation and trees, grading, noise and ground vibrations, noise from campus activities, artificial light, human presence, handling, automobile traffic, and the creation of new trails. Impacts to Crane Flat under Alternative 3 would include restoring and enhancing habitat for wildlife species, restoring native vegetation and hydrologic function, and revegetating social trails. In addition, impacts to rare, threatened, and endangered species would include construction- related loss of habitat, noise and ground vibrations, noise from campus activities, artificial light, human presence, automobile traffic, creation of new trails, and disturbance. Development under Alternative 3 would affect 32 special- status species that either occur at or contain suitable habitat at Henness Ridge. Impacts to Crane Flat under Alternative 3 would include restoring and enhancing habitat for special- status wildlife species.

Similar to Alternatives 1 and 2, impacts to the night sky at Henness Ridge would include a slight glow from campus operations, whereas impacts to Crane Flat under Alternative 3 would be a removal of all artificial lighting at the campus site. Impacts to the scenic resources of Henness Ridge under Alternative 3 would include a temporary contrast from construction activities, and a permanent contrast from new buildings, new water storage tank and new wellhead, and campus operations. Impacts to Crane Flat under Alternative 3 would include temporary contrast from construction equipment, demolished buildings, and exposed soil, and no contrast when all structures and infrastructure are removed from the campus site. Air quality impacts to Henness Ridge under Alternative 3 would include temporary construction- related engine and dust emissions and increased vehicle emissions from more users traveling to and from the campus. Impacts to Crane Flat under Alternative 3 would include the removal of all wood- burning stoves and the elimination of all campus-related vehicle emissions.

Impacts to the soundscape at Henness Ridge under Alternative 3 would include noise from construction equipment, noise associated with construction- related traffic, human voices, noise associated with educational activities and student play, and vehicle noise as people enter and exit the campus. Impacts to Crane Flat under Alternative 3 would include the removal of all campus- related activities, human voices, and vehicle noise and a return to the natural soundscape. Impacts to Henness Ridge under Alternative 3 would include construction- related energy consumption of fuel, materials, and electricity, and increased energy consumption; however, the energy- efficient facilities would decrease per capita energy consumption to near "net zero." Offsite energy consumption could increase with the new water system supplying the campus. Impacts to Crane Flat under Alternative 3 would include the removal of all campus- related energy- consuming infrastructure currently serviced by a diesel powered generator. Impacts to Wilderness at Henness Ridge under Alternative 3 would include a beneficial impact from the potential addition along Indian Creek and a minor adverse impact from campus activities such as hiking, snowshoeing, or skiing. Impacts to Crane Flat under Alternative 3 would also include the cessation of Wilderness program activities in this vicinity.

Under Alternative 3, at Henness Ridge, there would be no adverse effect on historic properties or cultural resources eligible for listing on the National Register of Historic Places (NRHP). Construction of the Henness Ridge campus would be designed to avoid adverse effects on CA- MRP- 1485H, a roadbed, and a segment of the Old Wawona Road (P- 22- 000296), Old Glacier Point Road, and Wawona Road (Highway 41). The discontinued use of a water tank and an offsite water treatment system to be installed and concealed inside the Chinquapin Ranger Station garage, a historic property, would be designed in consultation with the Park Historic Architect to avoid adverse effects. Restoration of the Crane Flat campus would have no effect on archeological historic properties. However, restoration of the existing Crane Flat campus would result in an adverse effect to three historic structures, which have been determined eligible for listing on the NRHP in consensus between the California State Historic Preservation Officer (SHPO) and the National Park Service. The adverse effect would be resolved by implementing standard mitigation measures detailed in the in the Stipulation VIII A of the 1999 PA (Appendix A), including 1) recordation, 2) salvage, 3) interpretation, and 4) National Register re- evaluation. Historic American Buildings Survey (HABS)/Historic American Engineering Record (HAER) photo- documentation would be completed prior to removal.

Concerning American Indian traditional cultural resources and practices, under Alternative 3, construction- and operation- related impacts would include minor impacts to local "cat face" trees at Henness Ridge. There would be no adverse effect to resources managed as American Indian Traditional Cultural Properties at Crane Flat.

Impacts to visitor experience and recreation at Henness Ridge under Alternative 3 would include temporary suspension of recreational opportunities at the campus, increased number of students able to stay on campus, decreased use of offsite facilities, improved educational activities, and reduced crowding. Impacts to Crane Flat under Alternative 3 would include improved scenic views along Tioga Road, enhanced wilderness characteristics of designated trail corridors in the area, and decreased use of informal trails between Tuolumne Grove and Crane Flat. Impacts to park operations at Henness Ridge under Alternative 3 would include increased campus- generated visitation to the park, decreased maintenance and repair work demands on facilities management staff, increased maintenance and operation work demands at Henness Ridge related to the new water system that will serve the campus, and increased fire protection for the campus. Impacts to Crane Flat under Alternative 3 would include increased demands on the facilities management staff to address safety and traffic concerns during demolition and restoration, but thereafter a limited demand on park operations. Impacts to transportation at Henness Ridge under Alternative 3 would include construction- related traffic for personnel, equipment, and materials, and, during operation, increased traffic on local roads from campus users traveling to and from the site. Impacts to Crane Flat under Alternative 3 would include demolition- and restoration- related traffic, with permanent elimination of all campus- generated traffic on roads in the Crane Flat area.

Impacts to land use at Henness Ridge under Alternative 3 would be inconsistent with the goals and actions stated in the Glacier Point Road Development Concept. Impacts to Crane Flat under Alternative 3 would include the redesignation of land use to the natural zone. In terms of community values, impacts to Henness Ridge under Alternative 3 would include increased demand for housing, services, and amenities in Yosemite West. Impacts to Crane Flat under Alternative 3 would include decreased demand for housing, services, and amenities in Foresta and El Portal. Impacts to socioeconomics at Henness Ridge under Alternative 3 would include increased construction- related employment, regional and local spending, and a shift in housing demand from the El Portal area to the Yosemite West area. Impacts to Crane Flat under Alternative 3 would include temporary construction- related employment, with a long- term decrease in employment, local spending, and the housing demand in the El Portal area.

ORGANIZATION OF THIS ENVIRONMENTAL IMPACT STATEMENT

The contents of this document are as follows:

Chapter 1, Purpose and Need – The first chapter includes a discussion of the purpose and significance of Yosemite National Park, an overview of the Yosemite Institute Program in Yosemite National Park, the proposed action's purpose and need, the relationship to laws and other plans, the tribal and public involvement in the process, the impact topics that were selected for detailed analysis, and the impact topics that were dismissed from further analysis.

Chapter 2, Alternatives – This chapter describes the alternatives for the proposed action, two action alternatives, and one No- Action Alternative. It also discusses alternatives considered but dismissed.

Chapter 3, Affected Environment and Environmental Consequences – This chapter provides a description of the affected environment of the proposed action for each alternative. This chapter also presents the methods and analysis of the potential impacts for each topic under each alternative.

Chapter 4, Consultation and Coordination – This chapter summarizes the consultations undertaken in the preparation and review of this document.

Chapter 5, List of Preparers – This chapter lists the names and qualifications of the individuals who have contributed to this document.

Chapter 6, Glossary and Acronyms – This chapter defines the technical terms and acronyms used in this document.

Chapter 7, Bibliography – This chapter lists the references cited in this document.

Appendices – The appendices are as follows:

- Appendix A: 1999 Programmatic Agreement, As Amended [Historic Preservation]
- Appendix B: Public Comment and Response Report
- Appendix C: Best Management Practices
- Appendix D: Special- Status Species Accounts
- Appendix E: Representative Site Photographs
- Appendix F: Air Quality Impact
- Appendix G: Historic Resources

- Appendix H: Traffic Impact Analysis Report
- Appendix I: List of Agencies and Organizations Receiving this Document

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

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CHAPTER 1: PURPOSE AND NEED

Introduction

> *"Park- based learning is powerful—and transformative. People more readily retain information, grasp meanings, and adopt new behaviors and values when directly involved with cultural and natural heritage resources and sites. Park Service education informs uniquely about the civic experience of our country and the complex, diverse ecology of our world. It encourages respect for our experience, as a nation, and invites stewardship. It is an organizational function that nurtures an aware citizenry, engaged to a greater extent in American public life. It is a mission of high national purpose. The National Park Service is committed to extend its leadership in education, to build on what is in place and to pursue new relationships and opportunities to make national parks even more meaningful in the life of the nation…"*
>
> *— Fran Mainella, Director, National Park Service (2000 – 2006)*

The National Park Service's (NPS's) mission is to preserve unimpaired the natural and cultural resources and values of the national park system for the enjoyment, education, and inspiration of this and future generations. The National Park Service strives to make high- quality interpretive and education facilities and services available for all park visitors. Yosemite Institute (YI) is a non- profit park partner that helps achieve this mission through operation of an environmental education campus in Yosemite National Park. YI programs provide experiential educational opportunities for children from diverse backgrounds that expose them to the wonders of our national parks. Each year, more than 13,000 students and teachers come to learn and experience Yosemite National Park through YI programs.

PURPOSE AND SIGNIFICANCE OF YOSEMITE NATIONAL PARK

Yosemite Valley and the Mariposa Grove of Big Trees were granted to the state of California by the federal government on June 30, 1864, to "be held for public use, resort and recreation" to be "inalienable for all time" (NPS 2004a). Yosemite National Park was established on October 1, 1890, as a "forest reservation" to preserve and protect "from injury, all timber, mineral deposits, natural curiosities, or wonders" within the park and to retain them in their "natural condition." On June 11, 1906, a joint resolution of Congress transferred management of Yosemite Valley and the Mariposa Grove from California to the federal government, to be included within the park. The two primary purposes for which Yosemite National was created are as follows:

National Park Service

"..to promote and regulate the use of the…national parks…which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

National Park Service Organic Act, 1916 USC 1.

> . . . preservation of the resources that contribute to Yosemite National Park's uniqueness and attractiveness—its exquisite scenic beauty; outstanding wilderness values; a nearly full diversity of Sierra Nevada environments, including the very special sequoia groves; the awesome domes, valleys, polished granites, and other evidences of the geologic processes that formed the Sierra Nevada; historic resources, especially those relating to the beginnings of a national conservation ethic; and evidences of the Indians that lived on the land.
>
> . . . to make the varied resources of Yosemite National Park available to people for their individual enjoyment, education and recreation—now and in the future (NPS 1980:2).

Under the California Wilderness Act of 1984, 94% of Yosemite National Park was formally designated as Wilderness. In 1984, the park was also designated a World Heritage Site in recognition of its international importance. Today, Yosemite National Park includes approximately 747,956 acres of the central Sierra Nevada in central California (Figure 1- 1).

Yosemite Valley is the primary visitor destination within Yosemite National Park. Yosemite Valley contains a variety of infrastructure and facilities, including trails, roads, bridges, tunnels, campgrounds, lodging, and utilities. A wide range of summer and winter recreational experiences for the visitor is available in the park, including hiking, picnicking, camping, rock climbing, fishing, photography, swimming, nature study, stock use, bicycling, sightseeing, rafting, cross- country skiing, and snowshoeing.

PARTNERSHIP BETWEEN THE NATIONAL PARK SERVICE AND THE YOSEMITE INSTITUTE

Part of the National Park Service's mission is to provide educational and interpretation programs that will lead to an appreciation and enjoyment of the scenic, natural, and cultural resources of Yosemite National Park. The *NPS General Management Plan* (1980) states "special facilities will be provided for students." The National Park Service itself does not have the resources to provide a full range of park programs. To provide the services necessary to help fulfill its mission, the National Park Service forms partnerships with other agencies, organizations, and individuals that can provide these services. Through public and private partnerships, the National Park Service strives to enhance visitor diversity, expand park use of new technologies, expand educational outreach, build community connections, and engage America's youth, helping them learn the value of protecting America's resources.

The National Park Service's partnership with the Yosemite Institute makes it possible for the park to reach thousands of children each year who would otherwise not be served. The Yosemite Institute currently operates under a Cooperative Agreement with the National Park Service, initiated in 1971, to continue to assist the park in fulfilling its education and interpretation mission and goals. YI programs provide educational adventures to students in Yosemite National Park to inspire a personal connection to the natural world and to promote responsible actions to sustain it.

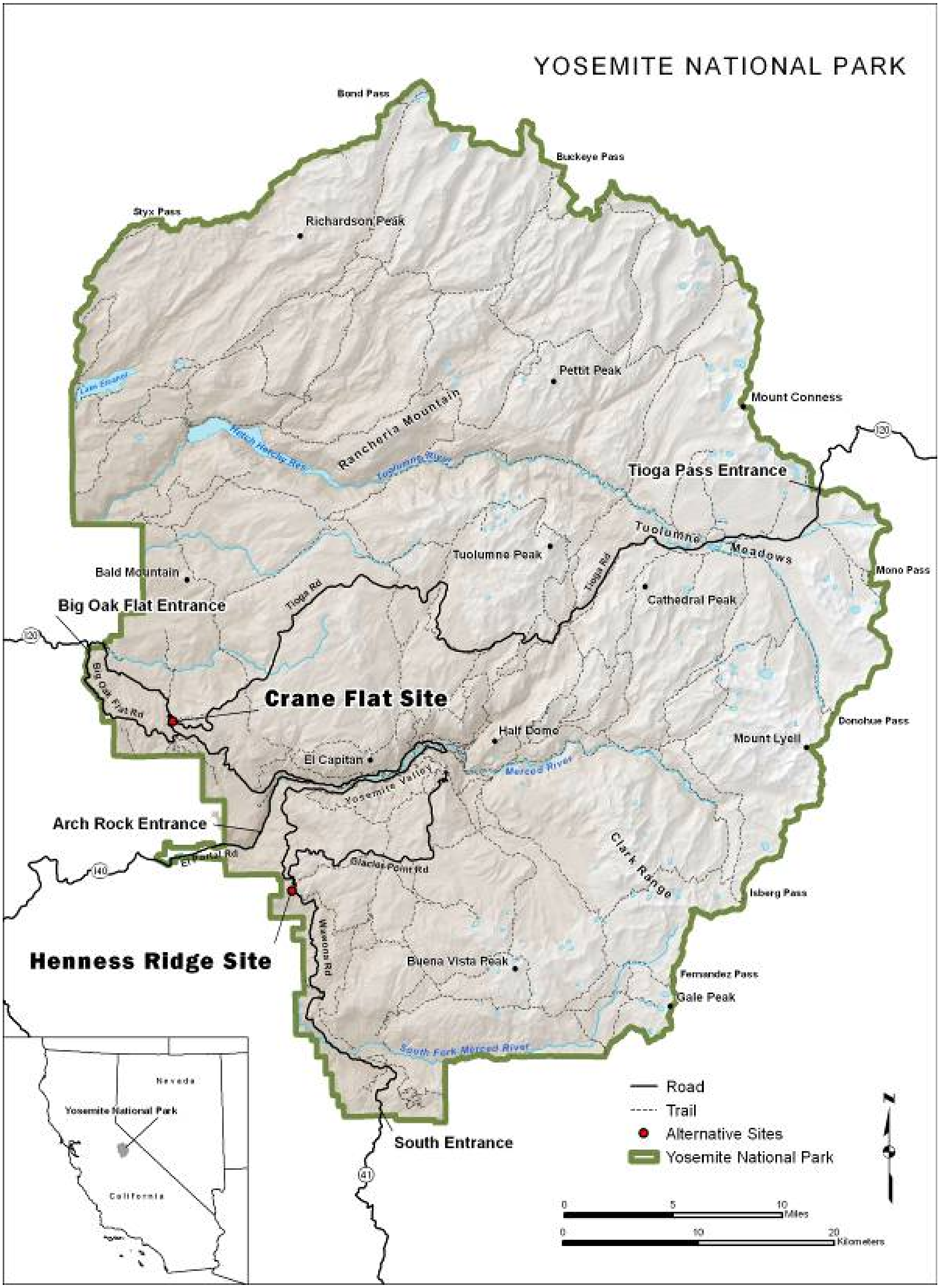

Figure 1-1. Yosemite National Park

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Overview of the Yosemite Institute Program in Yosemite National Park

Yosemite Institute Mission

Founded in 1971, Yosemite Institute is a private nonprofit organization dedicated to providing educational adventures in nature's classroom to inspire a personal connection to the natural world and responsible actions to sustain it.

The Yosemite Institute was founded in 1971, in response to the National Park Service's desire to improve educational and interpretive opportunities, and expand its potential to reach diverse audiences, through private partnerships. The Yosemite Institute is a private, non- profit 510(c) organization, overseen by the national organization, NatureBridge (formerly Yosemite National Institutes), which administers environmental education programs in three national parks.

YI programs provide exceptional outdoor environmental and science education in the inspiring natural setting of Yosemite National Park. These programs provide access to hands- on science using multiple teaching styles incorporating inquiry- based learning and experiential methodology. Students exposed to programs using natural environments for learning often become enthusiastic, self- motivated learners and gain a wealth of added educational benefits, including a comprehensive understanding of the world, advanced thinking skills leading to discovery and real- world problem- solving, and awareness and appreciation of the diversity of viewpoints within a democratic society (Lieberman and Hoody 1998). By complementing textbooks with an outdoor classroom, YI programs provide students a sense of place and a deeper understanding of life's interconnections while planting the seeds of stewardship for national parks and the world in which we live. The innovative, multidisciplinary approach to learning builds bridges between cultural awareness, geographic competency, and environmental conservation.

Campus Facilities and Operations

YI programs include a broad range of activities throughout Yosemite National Park. Many of the students travel from across the state to participate, and each program includes overnight stays for the students and their teachers. Campus facilities at Crane Flat are located along Tioga Road. These facilities are 15 miles from Yosemite Valley and approximately 1 mile from the Tuolumne Grove of Giant Sequoias. The existing facilities at Crane Flat include buildings left from a summer camp for the Civilian Conservation Corps (1933- 1941), the park's Old Blister Rust Camp (1946), buildings moved to the site after World War II, and other miscellaneous structures. In the early 1970s, the National Park Service used the Old Blister Rust Camp at Crane Flat as a summer firefighters' camp. Since 1973, under a cooperative agreement with the park, the Yosemite Institute has conducted programs and operated overnight facilities at the Crane Flat campus (Figure 1- 1). The Crane Flat campus currently has 84 overnight accommodations (76 student and 8 staff beds) and provides food service in structures owned by the National Park Service and operated by the Yosemite Institute. Although several interpretive facilities and programs within the park cater to the general visitor, the Crane Flat campus is the only facility specifically devoted to education and interpretation for school- aged children.

Environmental Education Program

Approximately 390 students participate in the Yosemite Institute's Residential Field Science Program each week during the school year, from September to May. This is less than the capacity of 416 students because only 60 students currently stay overnight at Crane Flat. Students rotate between facilities at Curry Village in

Yosemite Valley and those at Crane Flat. While in Yosemite Valley, students stay overnight at Curry Village in units owned by the National Park Service, operated by the park's concessionaire, and rented by the concessionaire to the Yosemite Institute under three- year agreements. No dedicated overnight accommodations related to the environmental education campus currently exist or are planned in Yosemite Valley. The campus at Crane Flat would continue to support a maximum of 76 students. Typically, 60 students are housed at Crane Flat with the remaining 340 staying at Curry Village.

Crane Flat differs significantly from Yosemite Valley in both climate and surroundings. The environmental education campus at Crane Flat is approximately 2,000 feet higher in elevation than Curry Village and receives much more snow than the floor of Yosemite Valley. Commonly, a significant snowpack at Crane Flat encourages study of winter ecology and adaptations. The difference in elevation between the two sites also provides students exposure to variations in vegetation and wildlife communities. The accommodations for students at Crane Flat are near some trails that are frequently used by park visitors, resulting in occasional diversions from the education programs as students interact with the public. However, diversions are much more common at Curry Village because of heavy pedestrian and vehicle traffic and development on the floor of Yosemite Valley. Comparatively, the Crane Flat campus offers a quieter experience for students.

PURPOSE OF AND NEED FOR ACTION

Since 1973, Yosemite Institute has hosted multi- day environmental education programs at park facilities at Crane Flat. Several interpretive facilities and programs within Yosemite National Park cater to the general visitor; however, the only designated facility within the park that is devoted to the education and interpretation needs of school- aged children is the current YI campus at Crane Flat (Figure 1- 2). YI provides environmental educational programs for children in Yosemite which complement California State Standards and offer opportunities for research and study of the natural world.

The campus facilities at Crane Flat consist of older buildings and structures that have been assembled over time and were not originally designed for educational purposes. Many of these buildings are deteriorating and in need of extensive repairs. The current facilities and layout of the campus do not optimize students' available time for learning, but rather lead to prolonged periods of waiting (e.g., for equipment) and in some cases discomfort (e.g., excessively hot and cold areas within sleeping quarters), among other issues. The outdated utility systems require expensive maintenance, mandate occasional campus closures, and can distract students and staff from their educational mission. The campus facilities are inefficient and poorly adapted for conserving water and energy, minimizing light and sound pollution, and protecting surrounding resources.

Facilities at Curry Village include overnight accommodations owned by the NPS, operated by the park's concessionaire, and leased for use by YI under three- year agreements. Although YI has operated a majority of its programs out of facilities at Curry Village since 1971, the concessionaire is not required to make these accommodations available for use by the YI beyond each three- year agreement, and their availability and commercial rate are not guaranteed.

The existing campus, including dormitory configurations, limits the number of groups that could potentially use the facility at one time. At present, students and teachers who are able to stay at the current Crane Flat campus find facilities that fall far short of contemporary health and safety standards; the campus has no designated classroom spaces, laboratories, and/or multimedia facilities that could complement students' outdoor learning and maximize the impact of their park experience, and the site has limited accessibility for individuals with disabilities. The dining room and shower- house are marginally sufficient for the number of students on site. Because the Crane Flat campus can accommodate only a fraction of the students enrolled in the program, the remainder (a majority) must be based elsewhere in the park in expensive commercial lodging that is secured through agreements that last only three years. Long- term availability for student lodging is unreliable, and the costs of the overall program are significantly higher because of this use of offsite lodging.

Design and development of a sustainable and functional campus is needed in order to achieve YI and NPS goals (i.e., providing high- quality, resource- related educational facilities and programs for children and adults) and meet current health, safety, and accessibility standards. An energy- and resource- efficient campus is also a priority, as is one that can fully support high- quality immersive environmental educational experiences. Such a campus is needed to provide a more suitable teaching and learning environment, and these improved facilities would enhance the students' overall park experience. Renovation of the Crane Flat campus or construction of a new campus at Henness Ridge (Figure 1- 2) would serve the unmet current and future capacity of park partners who focus on environmental education and interpretation. A distinct campus location separate from other park accommodations allows students to have more freedom to explore with a high degree of safety and security. A campus environment helps build a strong sense of community for groups, and allows for a greater sense of ownership and personal responsibility to be divested to the students. A distinct campus also allows instructors to educationally reinforce students throughout their stay, without the distractions that currently exist in the more developed areas of Yosemite Valley.

The purpose of the proposed action is to:

Provide a sustainable environmental education campus and program that best meets the educational and interpretive mission and goals of Yosemite Institute and Yosemite National Park, by

- Providing a safe, universally accessible campus that meets modern health and safety standards
- Creating a sustainable, ecologically sensitive, campus that protects park resources and attains standards for national Leadership in Energy and Environmental Design (LEED)
- That extends opportunities for children of all backgrounds to participate, and nurtures the development of future stewards of our National Parks and the environment

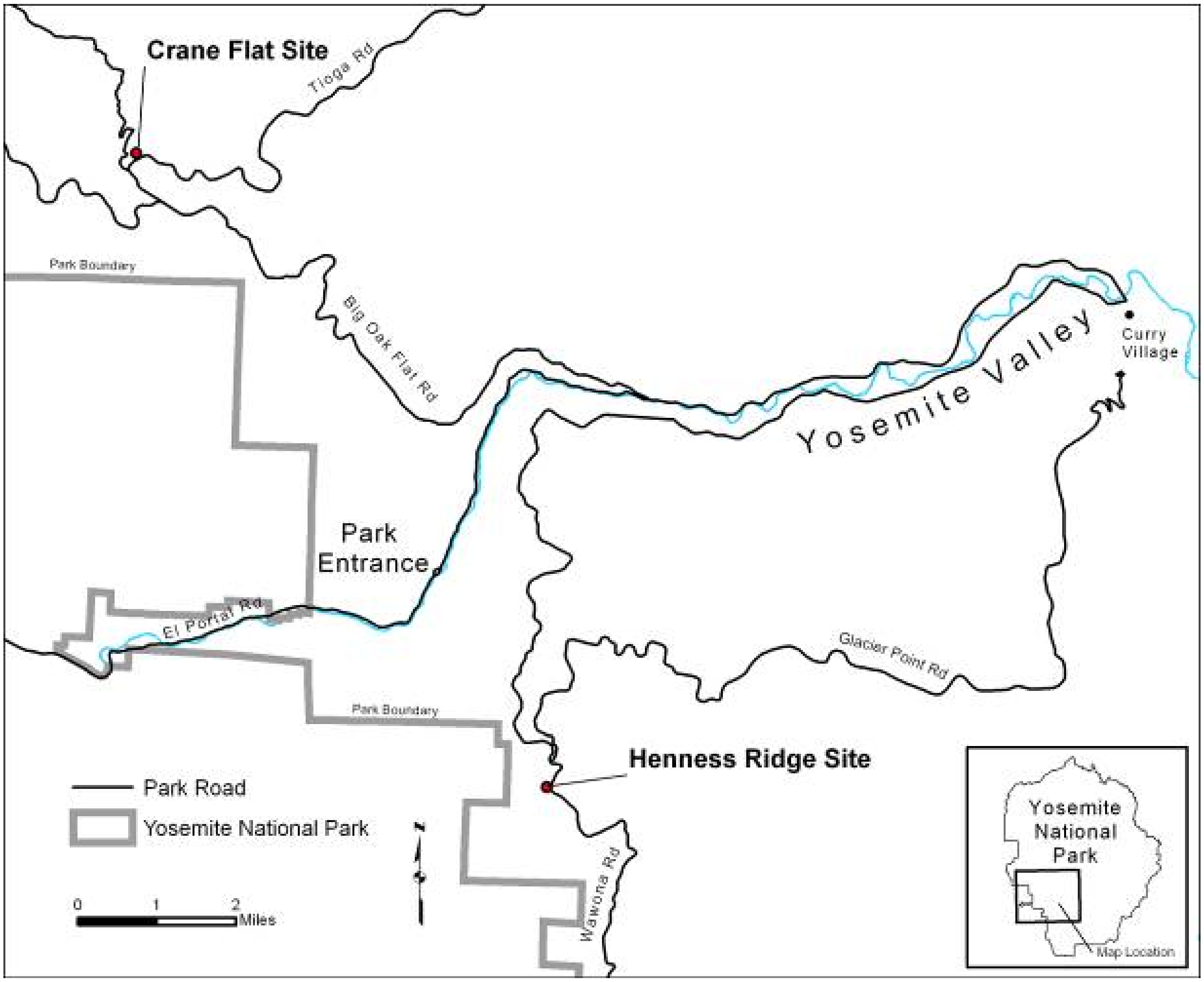

Figure 1-2. Location of Proposed Campus Sites and Curry Village

RELATIONSHIP TO LAWS, EXECUTIVE ORDERS, POLICIES, AND OTHER PLANS

Below is a summary of applicable laws, executive orders, policies, and other plans. The proposed action was evaluated and determined to be consistent with the park's general management plan and other applicable laws, executive orders, policies, and plans.

Yosemite National Park Plans

Planning in the National Park Service takes two different forms: general management planning and implementation planning. General management plans are required for national parks by the National Park and Recreation Act of 1978. The purpose of a general management plan is to set a "clearly defined direction for resource preservation and visitor use" (NPS 1998) and provide general directions and policies to guide planning and management in the park. The NPS *General Management Plan* (1980) is the overall planning document for Yosemite National Park. Changes to land use, such reclassifactions of development zones to natural zones, would amend the Plan.

The NPS *Revised Merced Wild and Scenic River Comprehensive Management Plan* (2005a) was a planning document that was rescinded in September 2009 after a complaint changed it and the *Yosemite Valley Plan* (see below). In designating the Merced River as a Wild and Scenic River, Congress directed the National Park Service to prepare its management plan for the river by making appropriate revisions to the park's *General Management Plan* (1980) (16 United States Code [USC] 1274[a][62]). River management plans must also be coordinated with plans for adjacent federal lands (16 USC, Section 1283). The NPS *Revised Merced Wild and Scenic River Comprehensive Management Plan* (2005a) intended to provide a framework for decision- making on future management actions within the Merced Wild and Scenic River corridor.

Implementation plans and projects, which tier from the NPS *General Management Plan* (1980) and other park plans, focus on "how to implement an activity or project needed to achieve a long- term goal" (NPS 2001). Implementation plans may direct specific projects as well as ongoing management activities or programs and provide a more extensive level of detail and analysis.

The NPS *Yosemite Valley Plan* (2000b) was an example of an implementation plan that outlines specific actions that intended to enable the NPS to meet the broad goals of the *General Management Plan* (1980) for Yosemite Valley and modifies other provisions based on more current information. Because of changes proposed by Yosemite Valley planning efforts to the NPS *General Management Plan* (guided by information developed since 1980), the National Park Service prepared the NPS *Yosemite Valley Plan* (2000b) to amend the NPS *General Management Plan* (1980) for Yosemite Valley. Nonetheless, the *Yosemite Valley Plan* and EIS were rescinded in September 2009 after a complaint challenged the Plan. The associated Settlement Agreement marks the beginning of a new planning process, which will lead to a new management plan for the affected area.

This EIS is tiered from the NPS *General Management Plan* (1980) and analyzes the redevelopment at Crane Flat and potential new development at Henness Ridge at a site- specific level of detail. Therefore, this EIS does not address broader Crane Flat area management issues. Overall direction for Crane Flat area management continues to come from the NPS *General Management Plan* (1980) and other current park resources management plans. Non- Yosemite Institute–related issues in Crane Flat include visitor services, law enforcement, camping, winter activities, and general meadow conservation and resources management.

Yosemite National Park General Management Plan of 1980

The NPS *General Management Plan* (1980) is the overall planning document for Yosemite National Park and provides guidance for the Yosemite Institute's proposed campus sites. The proposed action is consistent with guidance set forth by the NPS *General Management Plan* (1980).

The NPS *General Management Plan* (1980) for Yosemite National Park sets forth five broad goals for management of the park as a whole:

- Reclaim priceless natural beauty
- Allow natural processes to prevail
- Promote visitor understanding and enjoyment
- Markedly reduce traffic congestion
- Reduce crowding

The proposed action is consistent with these goals and other guidance set forth in the *General Management Plan*.

New Merced Wild and Scenic River Comprehensive Management Plan

The National Park Service produced a Merced Wild and Scenic River Comprehensive Management Plan and Environmental Impact Statement (EIS) in 2000, and a Revised Comprehensive Management Plan and Supplemental EIS in 2005 (NPS 2005a). Both plans resulted in litigation and the need to prepare a third Merced River Plan and Environmental Impact Statement. The planning process for the New Merced River Plan is currently underway.

Yosemite National Park Fire Management Plan (2004b)

The *Fire Management Plan* translates NPS fire management policies into specific management actions. The Yosemite fire management program has followed these policies for more than three decades. The plan's goal is to meet two of the park's primary objectives: ecosystem restoration, and mitigation of wildfire hazard through the use of prescribed and wildland fire on an ecologically significant scale.

The plan places new emphasis on the importance of executing risk reduction projects as well as restoring fire as a critically important ecological process. Prescribed burning and mechanical fuel reduction is used to restore and maintain ecosystems and target fuel loading in the wildland/urban interface (WUI). This area is defined as the primary park developments occupied throughout the year (Wawona, Foresta, El Portal, Yosemite West, Hodgdon Meadow, and Yosemite Valley) plus up to a 1.5- mile- wide belt around them.

Passive methods for reducing wildfire hazard fuels is used to clear non- Wilderness roadside vegetation (shrubs and small trees less than 20 inches in diameter) within 200 feet of the centerline and under utility lines. Public roads subject to this treatment are inside five WUI communities (Yosemite Valley is excluded): the El Portal, Big Oak Flat, and Wawona Roads within the Suppression Unit; and the roads to O'Shaughnessy Dam at Hetch Hetchy, Aspen Valley, and Glacier Point roads. One of the proposed campus sites is on Henness Ridge and is within a WUI.

Limited passive reduction techniques would be used in non- Wilderness within 200 feet of the centerline of paved roads, generally on shrubs and trees less than 20 inches in diameter and all downed shrubs and trees (NPS 2004b). The proposed action is consistent with the goals set forth in the *Yosemite National Park Fire Management Plan*.

Yosemite Resources Management Plan (1993a)

The NPS *Yosemite Resources Management Plan* (1993a) describes the status of park natural and cultural resources and recommends actions and programs needed to accomplish the legislative mandates applicable to the National Park Service and the park as well as to comply with other applicable environmental laws and NPS *Management Policies* (2006). The proposed action is consistent with the goals and guidance set forth in the *Yosemite Resources Management Plan*.

Yosemite National Park Vegetation Management Plan (1997)

The NPS *Yosemite National Park Vegetation Management Plan* (1997) established broad objectives for park vegetation management. Descriptions of plant communities, management issues, and management strategies and techniques were identified for achieving desired conditions for park vegetation communities (NPS 2004a:I- 20). As construction projects are implemented, existing vegetation needs to be salvaged and held onsite for short- duration projects or placed in temporary in- park holding facilities until construction is completed. Seeds, seedlings, or cuttings need to be collected. Site- specific integrity needs to be protected. The proposed action is consistent with the goals and guidance set forth in the *Yosemite National Park Vegetation Management Plan*.

Yosemite Wilderness Management Plan of 1989

The Yosemite Wilderness was established by the California Wilderness Act of 1984. The area is generally defined by the Tuolumne River and Merced River drainages, with lands ranging in elevation from 2,900 feet below Hetch Hetchy to 13,114 feet at the summit of Mt. Lyell. Of Yosemite National Park's 747,956 total acres, 704,624 acres (94%) have been designated Wilderness, and another 927 acres (0.1%) are potential Wilderness additions. The Yosemite Wilderness occurs in two large blocks north and south of Tioga Road and generally surrounds but does not include the environmental education campus at Crane Flat. The Wilderness boundary is immediately east of the proposed Henness Ridge site, and from here extends many miles to the east. YI programs use many trails in the Yosemite Wilderness, and under Alternative 3, impediments would be removed in a 64- acre parcel (the Old Glacier Point Road) along Indian Creek, making this area eligible for Wilderness as outlined in the 1984 Act.

The management policies of the National Park Service include a chapter on wilderness preservation and management, introduced with the statement that:

> The National Park Service will preserve an enduring resource of wilderness in the National Park System, to be managed for the use and enjoyment of wilderness values without impairment of the wilderness resource.

The NPS *Wilderness Management Plan* (1989a) states that the NPS seeks to preserve an environment in which the natural world, along with the processes and events that shape it, are largely untouched by human interference. Visitor use and enjoyment of wilderness are encouraged as long as such use does not result in impacts that seriously compromise the wilderness values the National Park Service is mandated to protect. Specifically, ecosystems—including plant and animal species and populations, along with unpolluted air and water—are protected in a natural state free from human structures, disturbances, and technology (NPS 1989a). The proposed action includes removal of impediments (water utility structures) to enable conversion of 64 acres of historic roadbed (Old Glacier Point Road) along Indian Creek to a Wilderness trail. This action is consistent with the goals and guidance set forth in the *Yosemite Wilderness Management Plan*.

National Park Service Policy and other Relevant Guidance

National Park Service Organic Act of 1916

The National Park Service Organic Act of 1916 established the National Park Service to "promote and regulate the use of parks" and defined the purpose of the national parks as "to conserve the scenery and natural and historic objects and wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."(16 USC 1) The Organic Act provides overall guidance for the management of Yosemite National Park.

The Organic Act establishes the management responsibilities of the National Park Service. Although Congress has given the National Park Service management discretion to allow certain impacts within parks, that discretion is limited by the statutory requirement that park resources and values be left unimpaired, unless a particular law directly and specifically provides otherwise. This cornerstone of the Organic Act establishes the primary responsibility of the National Park Service and ensures that park resources and values will continue to exist in a condition that will allow the American people to have present and future opportunities for enjoyment of them. NPS *Management Policies* (2001) provide guidance on addressing impairment. The proposed action is consistent with the goals and guidance set forth in the National Park Service Organic Act of 1916.

1970 National Park Service General Authorities Act (As Amended in 1978—Redwood Amendment)

This act prohibits the National Park Service from allowing any activities that would cause derogation (impairment) of the values and purposes for which the parks have been established (except as directly and specifically provided by Congress in the enabling legislation for the parks). Therefore, all units are to be managed as national parks, based on their enabling legislation and without regard for their individual titles. Parks also adhere to other applicable federal laws and regulations, such as the Endangered Species Act, the National Historic Preservation Act, the Wilderness Act, and the Wild and Scenic Rivers Act. To articulate its responsibilities under these laws and regulations, the National Park Service has established management policies for all units under its stewardship. The proposed action is consistent with the laws and regulations set forth in the General Authorities Act.

1999 Programmatic Agreement Among the National Park Service at Yosemite, the California State Historic Preservation officer, and the Advisory Council on Historic Preservation Regarding the Planning, Design, Construction, Operations, and Maintenance of Yosemite National Park

Under this programmatic agreement (PA) (Appendix A), the park has the responsibility to review and approve undertakings that are determined to have no effect or no adverse effect to historic properties that are not National Landmarks without further review by the State Historic Preservation Officer (SHPO) or the Advisory Council on Historic Preservation provided the stipulations of the agreement have been fulfilled. The agreement applies to undertakings performed by NPS lessees, permittees, concessionaires, cooperators, and park partners. The 1999 PA provides standard mitigation measures to resolve adverse effects on historic properties in consultation with SHPO, the public, and American Indian tribes. It also requires Yosemite National Park to "make every reasonable effort to avoid adverse effects to Historic Properties identified . . . through project design, facilities' location or other means" and to document avoidance alternatives through the National Environmental Policy Act (NEPA) process (NPS 1999). If avoidance of a Historic Property is not feasible or prudent, then Yosemite National Park may choose to implement one or more Standard Mitigation Measures described in the 1999 PA in consultation with the SHPO, the Indian Tribes, and the public.

National Park Service Education and Interpretation Mission and Goals (2005b)

The goal of the NPS interpretive and educational programs, as stated in Director's Order #6, Interpretation and Education, is

> *to provide memorable and meaningful learning and education experiences, foster development of a personal stewardship ethic, and broaden public support for preserving park resources. …Interpretation and education is the key to preserving both the idea of national parks and the park resources themselves.*

Such programs will be successful when they forge emotional and intellectual connections among park resources, visitors, the community, and park management (NPS 2005b). The National Park Service strives to provide visitors with an experience that is enjoyable and meaningful within the context of the park's resources and the values they represent. NPS interpretive and educational programs strengthen public understanding of the full meaning and relevance of heritage resources, both cultural and natural, by creating public dialogue and fostering civic engagement.

In a world of rapidly changing demographics, it is essential that interpretive and educational programs reach beyond park boundaries to schools and the wider general public (NPS 2005b). NPS educational programs are designed to enrich lives and enhance learning, nurturing people's appreciation for parks and other special places, therefore helping to preserve America's heritage. To accomplish this, the National Park Service strives to develop interpretive and educational programs according to the following principles:

- NPS programs are place- based. Programs use national parks and other places as dynamic classrooms where people interact with real places, landscapes, historic structures, and other tangible resources that help them understand meaning, concepts, stories, and relationships.
- NPS programs are learner- centered. Programs honor personal freedom and interests through a menu of life- long learning opportunities that serve a wide variety of learning styles, encourage personal inquiry, and provoke thought.
- NPS programs are widely accessible. Programs provide learning opportunities, reflect and embrace different cultural backgrounds, ages, languages, abilities, and needs. Programs are delivered through a variety of means, including distance learning, to increase opportunities to connect with and learn from the resources.
- NPS programs are based on sound scholarship, content methods, and audience analysis. Programs are informed by the latest research related to natural and cultural heritage and incorporate contemporary education research and scholarship on effective interpretive and educational methods.
- NPS programs help people understand and participate in our civil democratic society. Programs highlight the experiences, lessons, knowledge, and ideas embodied in America's national parks and other special places and provide life- long opportunities to engage in civic dialogue.
- NPS programs incorporate ongoing evaluation for continual program improvement and effectiveness. Programs are regularly evaluated and improved to ensure that they meet program goals and audience needs.
- NPS programs are collaborative. Where it furthers the NPS mission and is otherwise appropriate, programs are created in partnership with other agencies and institutions to achieve common goals.

National Park Service Director's Orders

The proposed action and EIS are consistent with the following NPS Director's Orders:

- Director's Order 2: Park Planning
- Director's Order 6: Interpretation & Education
- Director's Order 12: Conservation Planning, Environmental Impact Analysis, and Decision- making
- Director's Order 28: Cultural Resources Management
- Director's Order 50B: Occupational Safety and Health
- Director's Order 77- 1: Wetland Protection
- Director's Order 83: Public Health

Other Applicable Federal Laws, Policies, and Executive Orders

The National Historic Preservation Act of 1966, Section 106 (NHPA; 16 USC 470, as amended)

Section 106 of NHPA directs federal agencies to consider the effects of their actions on properties that are eligible for, or included on, the NRHP. Historical sites, objects, districts, historic structures, and cultural landscapes; archeological resources; and Traditional Cultural Properties (TCPs) that are eligible for listing on the NRHP are known as historic properties. Yosemite National Park's Section 106 review process is governed by the 1999 Programmatic Agreement Among the National Park Service at Yosemite, the California State Historic Preservation Officer, and the Advisory Council for Historic Preservation regarding the Planning, Design, Construction, Operations and Maintenance, Yosemite National Park (1999 PA) (NPS 1999) developed in consultation with associated American Indian Tribes and the National Trust for Historic Preservation. The NHPA Section 106 review process for this project is integrated into this document. The analysis of historic properties included in Chapter 3 complies with Section 106.

The Archeological Resources Protection Act of 1979 (ARPA; 16 USC 470aa- 470ll)

ARPA prohibits unauthorized excavation of archeological sites on federal land, as well as other acts involving cultural resources, and implements a permitting process for excavation of archeological sites on federal or Indian lands (see regulations at 43 CFR 7). ARPA also provides civil and criminal penalties for removal of, or damage to, archeological and cultural resources. The analysis of historic properties included in Chapter 3 complies with ARPA.

The Native American Graves Protection and Repatriation Act of 1990 (NAGPRA; 25 USC 3001 et seq.; see regulations at 43 CFR 10)

NAGPRA provides for the protection and repatriation of Native American human remains and cultural items and requires notification of the relevant Native American tribe upon accidental discovery of cultural items. No cultural resources covered by NAGPRA are present within the Crane Flat or Henness Ridge Alternatives.

The American Indian Religious Freedom Act of 1979 (AIRFA; 42 USC 1996)

AIRFA preserves for American Indians and other indigenous groups the right to express traditional religious practices, including access to sites under federal jurisdiction. Regulatory guidance for AIRFA is lacking, although most land- managing federal agencies have developed internal procedures to comply with AIRFA. Access to American Indian traditional religious practice sites will not be impacted by the Crane Flat or Henness Ridge Alternatives.

Executive Order No. 13007: Indian Sacred Sites

Executive Order 13007 directs federal agencies with statutory or administrative responsibility for the management of federal lands, to the extent practicable, permitted by law to accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and avoid adversely affecting the physical integrity of such sacred sites. No Indian sacred sites are present within the Crane Flat or Henness Ridge Alternatives.

Other Federal Laws and Executive Orders

The proposed action and EIS are consistent with the following federal laws and executive orders:

- National Environmental Policy Act (1969) (42 USC 4341 et seq.)

- California Environmental Quality Act (PRC Div 13, SS 21000–21006)
- Clean Water Act (33 USC 1241 et seq.)
- Clean Air Act (as amended) (42 USC 7401 et seq.)
- Endangered Species Act (16 USC 1531 et seq.)
- Secretary of the Interior's Guidelines for Architectural and Engineering Documentation (36 CFR Part 61)
- Wilderness Act (1964) (Public Law 88- 577)
- Wild and Scenic Rivers Act
- Executive Order 11593: Protection and Enhancement of the Cultural Environment
- Executive Order 11990: Protection of Wetlands
- Executive Order 12898: Environmental Justice
- Executive Order 12902: Energy Efficiency and Water Conservation at Federal Facilities
- Executive Order 13101: Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition
- Executive Order 13123: Greening the Government Through Efficient Energy Management
- Executive Order 13148: Greening the Government Through Leadership in Environmental Management

PUBLIC INVOLVEMENT

The formal public scoping period for the Environmental Education Campus Development Program at Crane Flat/Draft Environmental Impact Statement began on September 20, 2002, when a Yosemite National Park press release was sent to local and regional newspapers announcing the opening of public scoping on the Environmental Education Campus Development Program at Crane Flat/Draft Environmental Impact Statement. A Notice of Intent was published in the *Federal Register* on September 30, 2002, initiating a 45- day public scoping period. Scoping comments were accepted through November 14, 2002 (Appendix B, Public Comment and Response Report). During the scoping period, the National Park Service held discussions and briefings with: tribes, park staff, elected officials, public service organizations, and other interested members of the public.

The park conducted many public meetings about this project, including those on June 26 and June 29, 2002, at the East Auditorium in Yosemite Valley, and a site tour at the existing campus on June 29, 2002. Additional public meetings were held on July 20, August 21, and September 21, 2002, and February 26, March 28, and April 23, 2003. Detailed information on meeting locations and times was published in local and regional newspapers in advance and listed on the park's web page. Yosemite National Park management and planning officials attended these sessions to present the Environmental Education Campus Development Program at Crane Flat, receive oral and written comments, and answer questions.

In May 2003, an Administrative Draft EIS was produced for review by park staff, and draft concepts were presented to the public. However, during scoping, the park received comments from the public, park staff, and American Indian tribes regarding concerns about possible impacts to sensitive areas and natural resources (see discussion in next section), and suggested that a wider range of alternatives be considered. In response to these issues and concerns, the project team continued to collect and analyze resource data for the Crane Flat area (i.e., vegetation, wildlife, hydrologic, and cultural resource data) and expanded its range of options to consider 11 additional sites. The park conducted a Choosing by Advantage (CBA) workshop in

2006 to identify additional viable locations, and selected Henness Ridge as an additional site for analysis in the EIS.

In April 2006, NPS staff (representing a broad range of disciplines) and YI staff participated in an internal scoping facilitated by a CBA workshop. Using an established set of criteria, the group evaluated site suitability and ranked the 11 sites as to whether they would be reasonable, feasible, and meet the project purpose and need. One of the potential additional sites at Henness Ridge ranked far above all other sites in meeting the project's objectives. The project team presented the workshop results to park management, and a decision was made to include the Henness Ridge site as an alternative for full analysis in the EIS. The National Park Service and the Yosemite Institute have been engaged in dialog with the interested public and associated American Indian tribes, and provided regular updates to and meetings with Yosemite West homeowners association throughout the project.

The Draft EIS was made available to the public, federal, state, and local agencies and organizations for a 60-day public review period, during which the public and agencies were able to provide comment on the draft. A press release distributed to a wide variety of news media, direct mailing, placement on the park's website, and announcements in Yosemite Planning Update Newsletters, as well as in local public libraries, announced the availability of the Draft EIS. Responses to comments received have been included in this Final EIS.

IMPACT TOPICS SELECTED FOR DETAILED ANALYSIS

During scoping, the National Park Service invited the public to submit ideas and concerns pertaining to the proposed design and construction of the environmental education campus as previously described. The National Park Service also conducted internal scoping to elicit comments from Yosemite National Park staff and associated American Indian tribes regarding potential concerns. During the public scoping comment period, 58 responses were received through written correspondence. These comments were systematically reviewed and categorized by a content analysis team (Appendix B). Consultation with American Indian tribes was conducted by Yosemite National Park staff and is documented in Chapter 6. Comments and concerns were incorporated into the Socio- Cultural Resources and Historic Properties Sections in Chapter 3.

Public input was documented and analyzed using a process called content analysis, which is a systematic method of compiling and categorizing the full range of public viewpoints and concerns regarding a plan or project. Content analysis is intended to facilitate good decisionmaking by helping the planning team to clarify, adjust, or incorporate technical information into preparing the environmental impact statement.

It is important for the public and project team members to understand that this process makes no attempt to treat comments as votes. In no way does content analysis attempt to sway decisionmakers toward the will of any majority. Content analysis ensures that every comment is considered at some point in the decision process.

Natural Resources

Geology and Water Resources

The environmental education campus facilities at Crane Flat are situated along the boundary of the Tuolumne River and Merced River watersheds. Water supply is from groundwater pumped at Crane Flat Meadow, located west of the campus along Tioga Pass Road. Concerns were expressed that redevelopment or expansion of facilities at Crane Flat would increase water demand and groundwater pumping, which could in turn affect local groundwater resources and meadow habitat. Concern was also raised that redevelopment of the campus at Crane Flat could affect soil resources and sedimentation. Chapter 2, Alternatives, and the natural resources analyses presented in Chapter 3, Affected Environment and Environmental Consequences, address these issues.

Wetlands, Vegetation, Wildlife, and Special- Status Species

Yosemite National Park supports diverse habitats for plant and wildlife species. Natural habitats in the vicinity of the environmental education campus at Crane Flat include evergreen forests, meadows, and streams. Concerns were expressed that campus redevelopment should be designed to improve the environment and to avoid long- term adverse effects to sensitive habitats, especially nearby meadows, areas that may support rare plants, and the Tuolumne Grove of Giant Sequoias. Concern was also raised that redevelopment of the campus at Crane Flat could affect wildlife resources, such as habitat for great gray owl, nocturnal wildlife, neotropical bird migration routes, amphibians, species of bats, fishers, and wolverines. Chapter 2, Alternatives, and the natural resources analyses presented in Chapter 3, Affected Environment and Environmental Consequences, address these issues.

Air Quality and Noise

Yosemite National Park is a Class 1 airshed (under the Clean Air Act) and therefore must maintain the highest standard of air quality. Similarly, natural quiet is a valued resource. Concerns were raised that increased use of the Crane Flat facilities and increased transportation of students to and from the campus (both to the park and within the park) would have long- term effects on air quality and noise. These issues are addressed in the air quality and noise analyses presented in Chapter 3, Affected Environment and Environmental Consequences.

Socio- Cultural Resources

Historic Properties

Historic properties are cultural resources that are listed or eligible for listing on the National Register of Historic Places, and include prehistoric or historic districts, sites, buildings, structures, objects, landscapes, or traditional cultural resources to which American Indians attach cultural and religious significance.

Archeological Sites

Yosemite National Park is rich with archeological sites, both historic and prehistoric. Prehistoric sites are important for their research value and as a tangible link to the heritage of culturally associated American Indian people. Historic sites can provide information important to understanding past land use and management. Over the years, some of these sites have been eroded or covered by natural processes. Facility development has affected many of these sites. This issue is addressed in the cultural resources analysis presented in Chapter 3, Affected Environment and Environmental Consequences.

Historic Structures, Buildings, and Cultural Landscapes

Historically significant structures and landscapes exist throughout Yosemite National Park. The existing facilities at Crane Flat include buildings associated with the historic Blister Rust Camp and buildings constructed by the CCC as well as buildings associated with World War II that were relocated to this site in the 1950s. Historic structures, buildings, and cultural landscapes are addressed in Chapter 3, Affected Environment and Environmental Consequences.

American Indian Traditional Cultural Properties

Yosemite National Park is part of a living tradition for local American Indian groups. Many places within the park are important for traditional cultural practices. Many of these places and access to them have been affected by visitor use and park development. American Indian TCPs are addressed in Chapter 3, Affected Environment and Environmental Consequences.

American Indian Traditional Cultural Practices

Yosemite National Park is part of a living tradition for local American Indian groups. Traditional cultural practices, including the conduct of traditional ceremonies, are important in the park. Some of these practices have been affected by visitor use and park development. American Indian traditional cultural practices are addressed in Chapter 3, Affected Environment and Environmental Consequences.

Land Use

Land uses in the vicinity of the environmental education campus at Crane Flat include the environmental education facility itself, designated Wilderness, visitor attractions, such as the Tuolumne Grove of Giant Sequoias, and visitor services and facilities such as the campgrounds, trails, gas station, and store. The primary land use concern involved any proposed modifications to designated Wilderness. This issue is addressed in Chapter 2, Alternatives, and in the land use analysis presented in Chapter 3, Affected Environment and Environmental Consequences.

Scenic Resources

Yosemite National Park offers incomparable scenic vistas. Tioga Pass Road affords views of unbroken forests, meadows, wetlands, and scenic panoramas. Concerns were expressed that new development at Crane Flat could affect the scenic quality of the area. This issue is addressed in Chapter 2, Alternatives, and in the scenic resources analysis presented in Chapter 3, Affected Environment and Environmental Consequences.

Visitor Experience

Sightseeing, photography, hiking, walking, camping, and nature study are among the recreational activities available within the vicinity of the environmental education campus at Crane Flat. Concerns were expressed that redevelopment of the Crane Flat facilities could affect local trails, the visitor experience at the Tuolumne Grove of Giant Sequoias, and the wilderness experience near the campus. Concerns were also expressed regarding maintenance of the high- quality educational programs offered and the visitor experience of students of the campus. These issues are addressed in the visitor experience analysis presented in Chapter 3, Affected Environment and Environmental Consequences.

Socioeconomics, including Employee Housing

The environmental education campus provides programs primarily to school- age students. Concerns were expressed regarding the high cost of these programs and the need for decreased costs, increased scholarships, and increased diversity among the student population. These issues are addressed in Chapter 1, Purpose and Need, Chapter 2, Alternatives, and in the socioeconomic section of Chapter 3, Affected Environment and Environmental Consequences.

Yosemite Institute, the nonprofit park partner that administers the environmental education campus within Yosemite National Park, supplies housing for it teachers and other employees. Concerns were expressed concerning increased staff and staff housing on nearby communities. This issue is addressed in Chapter 2, Alternatives, and in the socioeconomic section of Chapter 3, Affected Environment and Environmental Consequences.

Transportation

The environmental education campus at Crane Flat is located along Tioga Pass Road, one of the main park roadways. Concern was raised that expansion of campus facilities at Crane Flat could affect safety along Tioga Pass Road due to increased vehicle trips to and from the campus and an increase in the student population. Concerns were also expressed that the effects of increased vehicle trips could radiate to other roadways within the park, such as in Yosemite Valley. Other transportation issues raised included facility parking, fuel consumption, vehicle wear, and paved surfaces. These issues are addressed in Chapter 2, Alternatives, and in the transportation analysis presented in Chapter 3, Affected Environment and Environmental Consequences.

Park Operations and Facilities

Although the environmental education campus at Crane Flat is administered by Yosemite Institute, the National Park Service provides an array of emergency and nonemergency services. Concerns were raised that expansion of campus facilities could increase demand for fire or protection services or utilities. These issues are addressed in Chapter 2, Alternatives, and in the park operations analysis presented in Chapter 3, Affected Environment and Environmental Consequences.

Other Issues: Planning Processes and Management

Plans and Policies

The NPS *General Management Plan* (1980) identifies management zoning and management goals for the park and the Crane Flat area. Implementation of the proposed action should be consistent with adopted zoning and management goals. This issue is addressed in Chapter 2, Alternatives and in Chapter 3, Affected Environment and Environmental Consequences.

Alternatives

NEPA requires federal agencies to evaluate a reasonable range of alternatives during the planning and compliance process. Considerable concern was expressed regarding alternative configurations and locations for the environmental education campus. Concerns were expressed that the environmental education campus should be a sustainable facility that uses green technologies. These issues are addressed in Chapter 2, Alternatives.

Cumulative Effects

NEPA requires federal agencies to evaluate cumulative effects of past, present, and reasonably foreseeable future actions. The cumulative impact analysis for each resource under each alternatives is provided at the end of Chapter 3, Affected Environment and Environmental Consequences.

User Capacity

User capacity refers to the amount and type of users that can use an area without harming resources. Concerns were expressed regarding the overall user capacity of the Crane Flat area. This issue is addressed in Chapter 2, Alternatives, and Chapter 3, Affected Environment and Environmental Consequences.

Relationship between the National Park Service and Yosemite Institute

In 1971, Yosemite National Park developed a partnership with the nonprofit organization Yosemite Institute (a division of the national organization Yosemite National Institute) to administer the environmental education campus within the park. Concerns were expressed concerning the role of the Yosemite Institute within the park and its relationship with the National Park Service. This issue is addressed in Chapter 1, Purpose and Need, and Chapter 2, Alternatives.

Relationship between the Environmental Education Campus Development Program at Crane Flat and Other Development in the Crane Flat Area

In addition to the environmental education campus at Crane Flat, other development in the Crane Flat area involving visitor services and facilities includes campgrounds, trails, the Tuolumne Grove of Giant Sequoias, and the gas station and convenience store. Concerns were expressed that the National Park Service should prepare a plan for the entire Crane Flat area. The National Park Service has determined that the redevelopment of the environmental education campus is a single and complete project and that combined planning for this and other potential future actions, such as campground expansion, would be inappropriate. Therefore, this issue was dismissed from further analysis.

The following impact topics were identified during the public scoping process and by staff of Yosemite National Park. These topics are described and possible impacts to them are addressed in the analysis presented in Chapter 3: Affected Environment and Environmental Consequences.

IMPACT TOPICS ANALYZED IN THIS EIS

Natural Resources

- Geology, Geologic Hazards, and Soils
- Hydrology
- Water Quality
- Wetlands
- Vegetation
- Wildlife
- Rare, Threatened, and Endangered Species
- Night Sky
- Scenic Resources
- Air Quality
- Soundscape
- Energy
- Wilderness

Socio- Cultural Resources

- Historic Properties
  - Archeology
  - Historic Structures, Buildings, and Cultural Landscapes
  - American Indian Traditional Cultural Properties
- American Indian Traditional Cultural Practices
- Visitor Experience and Recreation
- Park Operations
- Transportation
- Land Use

- Community Values
- Socioeconomics
- Park Operations
- Transportation
- Land Use
- Community Values
- Socioeconomics

IMPACT TOPICS DISMISSED FROM FURTHER ANALYSIS

The following impact topics were considered during scoping, but dismissed from further analysis, because theses resources are unaffected or negligibly affected by the various alternatives given the scale or location of the project:

- Floodplains
- Urban Quality
- Contemporary Local Cultural Traditional Practices
- Museum Collections
- Museum Objects
- Environmental Justice
- Paleontological Resources
- Cave Resources
- Hazardous Materials
- Unique Ecosystems, Biosphere Reserves, and World Heritage Sites

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CHAPTER 2: ALTERNATIVES

INTRODUCTION

This chapter describes in detail the various alternatives proposed for the Yosemite Institute's (YI's) environmental education campus. The comprehensive alternatives development process, which involved extensive public and National Park Service (NPS) staff input over a several year period, is also discussed and presents the rationale for ultimately choosing the alternatives retained for further analysis in this environmental impact statement (EIS).

Three alternatives for the environmental education campus are considered. Alternative 1, the No- Action Alternative, represents no change in the layout and management of the existing facility at Crane Flat, and the educational program would remain as- is. The existing campus accommodates 76 students. Under Alternative 2, the campus at Crane Flat would be redeveloped, and changes would be made to the site layout and the number of students the campus would be able to accommodate. Most existing structures would be removed, and the new campus would accommodate 154 students. Under Alternative 3, a new campus would be built at Henness Ridge, approximately 10 miles south of the current site. The new campus would accommodate 224 students. Numerous other site and campus design alternatives were considered in detail but were dismissed for a variety of reasons, and are described at the end of the chapter.

ELEMENTS COMMON TO ALL ALTERNATIVES

All alternatives provide an environmental educational program that extends opportunities for diverse groups of young people to experience their national parks, in a rustic residential setting operated under partnership between the Yosemite Institute and the National Park Service, within Yosemite National Park.

Yosemite Institute Environmental Education Program

Most aspects of the Yosemite Institute's environmental education program would remain the same under each alternative. Every YI program is organized around a coherent theme or set of themes and objectives, whether the program is one day or a full week, or for children or adults. Each teaching day has its own theme, which is presented in an interdisciplinary fashion. The theme is illustrated through a mix of facilitated explorations, hiking, discussions, activities, and reflection. Evening programs complement field learning. Under each alternative, students would be able to hike the park's trails to the top of Yosemite, Vernal, and Nevada Falls along the Mist Trail (Figure 2- 1, which also includes unrelated trails), to ancient giant sequoia groves, or to panoramic vistas such as Glacier Point. Expansive meadows, shaded oak woodland, coniferous forests, and sandy shores of the Merced River would provide places for learning, group activities, and personal reflection. Group sizes for these activities would be the same for all alternatives. Associated American Indian tribes would be participants in developing curriculum relevant to use of American Indian use natural and cultural resources in the locales.

The program director works with each school group coordinator to tailor the program itinerary to best meet the group's intellectual, personal, and physical needs. Core education themes include sense of place (by cultivating students' observation skills, understanding, and sensitivity to the biotic, climatic, and physical attributes of place; nurturing student connections with place both personally and emotionally; and building understanding of how place is influenced by humans), stewardship (by facilitating experiences in the park that introduce students to service and stewardship, identifying exemplary ways of how people make a difference, taking a personal stewardship role to sustain our natural and human communities, and inspiring actualization of our stewardship role), and interconnections (by developing students' understanding of the interconnectedness of all things, how ecosystems function, and the cause and effect of human actions on natural systems).

Subject areas include the following:

- Forest and fire ecology
- Winter ecology
- Global environment
- Wilderness skills
- National park history
- American Indian culture history
- Arts and humanities
- Invertebrates
- Plant communities
- Mammals
- Birds
- Botany
- Earth science
- Pioneer history
- Soils
- Meteorology
- Geology
- Ecological concepts
- Succession
- Reptiles and amphibians

Sample activities include the following:

- One- on- one teaching
- Animal tracking
- Riparian habitat study
- Group problem- solving
- Natural history investigations
- American Indian culture interpretation
- Hiking and exploration
- Journaling
- Interactive games
- Cross- country skiing and snowshoeing
- Wilderness camping and orienteering skills

Transportation to and from Yosemite National Park is the responsibility of participating schools. Programs typically arrive on Sunday afternoon and depart Friday morning.

Residential Field Science Program

The Yosemite Institute Residential Field Science Program is a two- to five- day academic field studies program designed especially for students from elementary school through high school. Students stay in overnight accommodations at the Crane Flat campus or at Curry Village (Yosemite Valley). The average class size includes at least 14 students, one accompanying adult (chaperone), and one YI instructor for a total of 16. A typical day for the Residential Field Science Program is as follows:

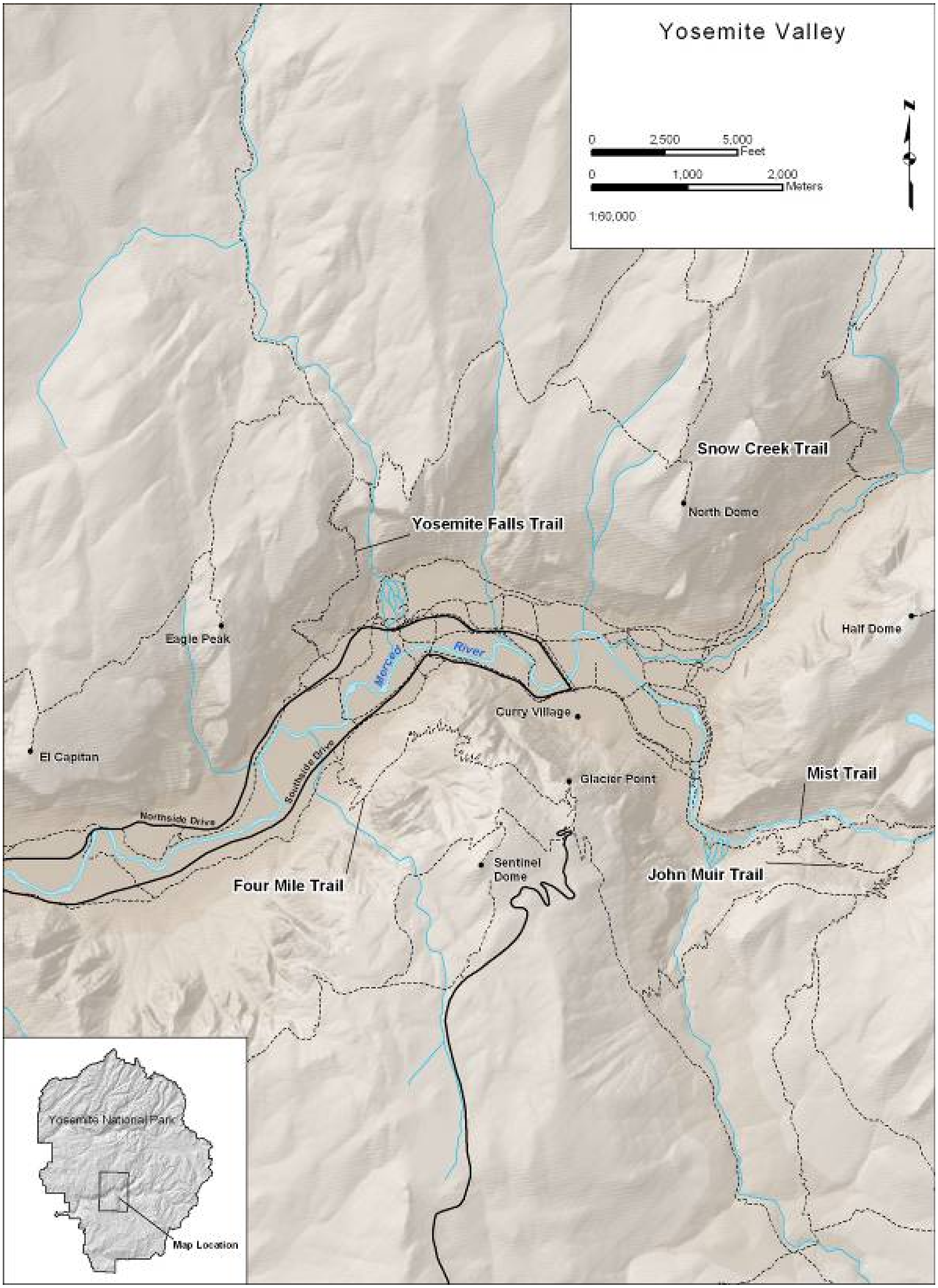

Figure 2-1. Trails In and Near Yosemite Valley Used by YI Programs

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7:30 a.m.	Breakfast and cleanup
9:00 a.m.	Welcome and morning meeting
9:15 a.m.	Depart for a day of exploring Yosemite National Park—introduction of the day's theme and mind map; warm up and team- building exercise—field studies, all- day hikes (2 to 6 miles on varied terrain), natural history explorations and ecology lessons—field lunch—personal reflection and journaling—sharing circles—closure/assessment
4:00 p.m.	Return to campus—recreation time supervised by chaperones
5:30 p.m.	Dinner and cleanup—school- assigned activities
7:30 p.m.	Evening program
8:30 p.m.	Return to cabins—chaperon supervised
9:30 p.m.	Lights out

Accommodations at Curry Village

Camp Curry was founded in 1899 by David and Jenny Curry. It offers comparatively affordable room and board within Yosemite Valley. The camp originally comprised a dozen tents with a common dining center; it is currently hundreds of tents. Students at Curry Village stay in canvas- covered tent cabins. These tents consist of a wooden frame, wooden floor, and wooden door with four sides of canvas and a canvas roof and fly and are equipped with cot style beds and an electrical light. Because of the nature of the tent cabin, they are not outfitted with electrical outlets, telephones, televisions, or plumbing. Sheets, wool blankets, and pillows are provided and placed at the foot of the bed. Some of the tent cabins are heated.

Though students have been staying at Curry Village for many years, recent dangerous rockfall forced the Yosemite Institute to find temporary housing outside of Yosemite National Park. Conversion of the Curry Village staff accommodations to guest accommodations in the Boystown area allowed Yosemite Institute to return to Yosemite Valley.

Elements Common to Action Alternatives

Several elements are common to all the action alternatives (Alternatives 2 and 3), including portions of construction design, sustainability and green technology, lighting, site drainage, Americans with Disabilities Act (ADA) compliance, emergency access, and some techniques to increase water and energy conservation.

Construction Design

Most structures for the campus would be single- story construction; the dining hall would be two stories. Construction design is influenced by the following:

- Short construction season from April to November and the need to establish a weather- tight shell by start of winter
- Structures need to withstand heavy snow loading
- Construction work force would be local and regional

- Limited sun exposure and use patterns of cabins may limit the effectiveness of thermally massive heating strategies
- Winter heating demands necessitate importance of insulation
- The foundations need to accommodate both flat and sloped sites
- The need for fire- resistive construction is not so great as to mandate concrete or other such construction

Sustainability and "Green" Technology

Under the action alternatives, state- of- the- art sustainable and "green" technologies designed to minimize impacts on natural resources, consistent with the NPS's *Guiding Principles of Sustainable Design* (1993b), would be implemented. The campus would act as a teaching instrument for instructors to introduce sustainable and environmentally friendly practices. Central to the concept of sustainable development is the idea that all decisions—from initial concept through design, construction, and operation—are evaluated in light of the principles of natural and cultural conservation. The sustainable principles and technologies incorporated into each of the action alternatives are as follows:

- Reuse and recycle materials
- Orient buildings to maximize sun exposure for heat gain, photovoltaic panels, photovoltaic cells, and/or solar water heating and to minimize effects of prevailing winds
- Minimize grading by building on existing contours and landforms
- Minimize tree and vegetation removal
- Restore disturbed areas with native, drought- resistant plants
- Use cogeneration technology to heat water
- Install energy- and water- efficient features and utilities
- Promote infiltration

Lighting

Natural darkness and the night sky play an important part in the overall visitor experience to the park and the environmental education campus, providing outstanding opportunities for stargazing and observing the moon. Unlike urban or suburban settings, there is essentially no ambient light. For this reason, all proposed lighting systems for the action alternatives would conform to NPS's Dark Sky Policy and the draft Yosemite National Park lighting guidelines while also meeting public health and safety needs.

All lighting would be energy efficient. Most lighting fixtures would use fluorescent lamps with electronic ballasts. Small fixtures would use compact fluorescent lamps or LED (light- emitting diode) lamps as applicable. Exterior lighting would use energy- efficient metal halide or compact fluorescent lamps. The exterior lighting system would conceal light sources, to the extent possible, to minimize the impact on the night sky. Low- height lighted bollards would be used in parking areas in lieu of overhead pole lighting. Low-level down- lighting and unobtrusive luminaries would be used at facilities and building entrances and exits.

Lighting in the cabins would be controlled via time switch and occupancy sensors, with manual overrides for emergencies. In the bathhouses, lighting would be controlled with occupancy sensors so the facilities could have 24- hour usage. Care would be taken to specify the correct type of sensor and install the correct locations to avoid inadvertent shut- off.

Site Drainage

Erosion and flood risks to life and property would be minimized through building design. Natural site drainage patterns would remain largely unchanged. Buildings and walkways would be elevated on concrete caisson foundations in lieu of continuous concrete spread footings to minimize the interruption of natural site drainage and reduce the impacts of foot traffic on the site. An on- grade gravel base would be installed at the base of structures to prevent erosion from rooflines.

Americans with Disabilities Act Accessibility

Designs of the action alternatives are consistent with NPS DO 16A (Accessibility for Employees and Job Applicants) and DO 42 (Accessibility for Park Visitors). Site design would incorporate accessibility into the routes within the site, parking spaces, passenger loading zones, building entrances, and ground and floor surfaces, as required. Both action alternatives would result in improved accessibility.

Fire and Emergency Access

Designs under the action alternatives are consistent with the National Fire Protection Association (NFPA) standards. Fire lanes and emergency access will be provided for all human occupancy buildings but would be adjusted for buildings with approved sprinkler systems incorporated into the building design. Fire lanes providing one- way travel will be a minimum of 12 feet wide. Primary access interior roads would be designed to support up to 40,000 pounds of equipment with periodic turn- arounds allowing a turning radius of 50 feet. All gates will have standard park emergency access locks. Primary roads will be at a grade of 10% or less. Automatic fire sprinklers and fire safety equipment would meet NFPA standards. A fire sprinkler system would be installed in all overnight facilities. The fire sprinkler system requires 400 gallons per minute (gpm) for an approximate running time of 30 minutes, for a total of 12,000 gallons. Fire hydrants would be strategically located 300 feet apart throughout the campus, with flow rates of 1,500 gpm for two hours of operation. Flow of a hydrant for two hours would require a total of 180,000 gallons.

Water Conservation

The plumbing designs under both action alternatives include installation of state- of- the- art sustainable low- flow plumbing fixtures, low- volume urinals and toilets, and push showers. Because site restoration and landscaping would use native species, no long- term irrigation would be required.

With regard to water demand for fire protection, the amount provided would be the same under both action alternatives, though there is a difference in the number of accommodations. Recycled graywater from bathhouses plumbing fixtures would be used to flush low- volume toilets and urinals to greatly reduce the overall use of potable water and generation of wastewater. An advanced onsite wastewater treatment system, consisting of textile media filters, would polish the effluent to near reuse quality before disposal to soil absorption leach or drain fields.

Separation of graywater or laundry water would be used to flush toilets to greatly reduce the overall use of potable water and generation of wastewater. In addition, low- flow urinals and low- flow or foam toilets would be installed to further reduce wastewater generated. For advanced treatment, a recirculating sand filter or textile filter would be added to polish the clarified effluent to advanced standards, and with disinfection, the discharge quality would be equal to that of recycled water.

Energy Conservation

Net- zero energy use (meaning that the consumption of energy at the campus is no more than the energy produced by the campus in a given year) and the maximum Leadership in Energy and Environmental Design (LEED) rating are goals under both action alternatives. To accomplish this, energy use would be minimized through the use of energy- efficient equipment and controls that limit the use of power to only those times when necessary. Office use would be limited to laptop computers in lieu of desktops to save a significant amount of energy. In addition, occupancy- controlled plug strips would be used to turn off monitors and peripheral equipment when not in use. The most energy- efficient Energy Star–rated equipment would be installed throughout the campus, such as copiers, fax machines, refrigerators, dishwashers, and washing machines, which would help minimize loads to allow a smaller, more cost- effective photovoltaic system to be installed.

Energy meters would be installed in each building where energy production and use could be monitored and studied. Energy consumption was estimated based on energy- efficient systems, as recommended in the Mechanical/Electrical Green Building Study (Ayres 2002). Energy- efficient systems used in site design include natural ventilation (no air conditioning), entry vestibules to reduce heat loss, energy- efficient lighting, and thorough insulation.

Sites with annual solar access would include passive solar systems, photovoltaic cells, and/or solar water heating. With energy- efficient design and possible tree removal, most of the electricity and some of the water heating would be provided by photovoltaic cells, solar thermal, and geothermal heat pumps. Warm air produced during cooking in the kitchen would be pumped to a drying room below the kitchen in the dining hall building.

ALTERNATIVE 1: NO ACTION

The No- Action Alternative maintains the status quo for the environmental education campus at Crane Flat and Yosemite Valley components of the educational program. This no- action concept follows the guidance of the Council for Environmental Quality, which describes the No- Action Alternative as representing no change from the existing management direction or level of program. It provides a baseline with which to compare the action alternatives.

Under the No- Action Alternative, the campus at Crane Flat would remain in its existing condition (see Chapter 1 for an overview of the existing campus), and the Yosemite Institute would continue operating and providing programs as they do currently (i.e., status quo). Necessary maintenance and repairs would continue to facilities at Crane Flat but no major undertakings (for example, construction of new buildings or utilities systems) would occur. There would be no changes in circulation, facility locations, or number of accommodations—the number of students (76) and staff (8) at Crane Flat and the historical number of students and chaperones (approximately 340) at Yosemite Valley would remain the same. Therefore, the overall student capacity would remain at historic levels, which have been up to approximately 416 students per day in the park (up to 550 students on days when arriving and departing groups overlap). These estimates include those students accommodated at both the existing Crane Flat campus and at Curry Village (including Boystown) in Yosemite Valley. Due to an October 2008 rockfall near Curry Village, and the related closure of 234 visitor accommodations (commonly used as student accommodations by Yosemite Institute), the number of students accommodated at Curry Village has been temporarily reduced from an average maximum level of approximately 340 students to approximately 237 students.

The No- Action Alternative does not provide a sustainable, energy- and water- efficient facility that meets all current health and safety standards. It does not meet the purpose and need (as described in Chapter 1), to establish a campus and program that better serves the combined missions of the Yosemite Institute and the National Park Service in an efficient, effective, and environmentally conscious manner.

Campus Character and Site Design

Figure 2-2. Building at Crane Flat Campus

The environmental education campus at Crane Flat is in a heavily forested area just north of Tioga Road (Figure 2- 2). The site is mixed- conifer forest, with numerous large conifers such as sugar pine, incense cedar, and white fir providing shade and some cover among the various buildings (Figure 2- 3). Several meadows are nearby. The site faces slightly north and retains a snowpack well into the spring. The buildings that comprise the campus are of various ages and design, but average 60 years in age. Under this alternative, the campus would retain its rustic setting, operating out of buildings constructed by the Civilian Conservation Corps in the 1930s and buildings that are part of the park's old Blister Rust Camp. A few other campus buildings were moved to the site after World War II. There would be no changes in circulation, facility type or location, or number of overnight accommodations.

All facilities that currently exist at Crane Flat would remain (Figure 2- 4). These include two student dormitories that can accommodate 76 students (students and chaperones), a bathhouse, kitchen and dining hall, storage areas (gear storage/distribution), an administrative trailer (site office), two staff trailers, and one temporary staff dormitory (bunkhouse). The existing campus includes a total of 14 structures with approximately 7,746 square feet of interior space and a 20- space parking lot within 0.3 acre (see Table 2- 1). The total campus footprint is approximately 3 acres. The Yosemite Institute would continue to provide outdoor- oriented environmental education and interpretation programs, with no indoor space for further learning or for use during periods of inclement weather.

Although efforts have been made to improve accessibility for those with disabilities, the campus buildings in their existing condition fail to meet accessibility goals and standards outlined in NPS Director's Order (DO) 16A (Accessibility for Employees and Job Applicants) and DO 42 (Accessibility for Park Visitors). The only portions of the campus that provide disabled access and meet the requirements of the Americans with Disabilities Act (ADA) are the bathhouse, dining hall, and two student dormitories. There is no universal accessibility for disabled persons. Also, the current campus does not meet various National Fire Protection Association (NFPA) standards for facilities and access.

Table 2-1. Summary of Alternative 1: No Action

Program Element	Quantity	Gross Square Footage	Capacity
Standard cabins/dormitory	2	2,278	76 beds
Cabins with baths	0	N/A	N/A
One-bedroom apt (staff)	0	N/A	N/A
Studio apts (staff)	0	N/A	N/A
Bunkhouse/dormitory (staff)	3	1,188	8 beds
Total Living Space		3,466	76 students/8 staff
Arrival shelter	0	N/A	N/A
Dining hall/Kitchen	1	1,321	49 persons
Bathhouse(s)	1	916	4 sinks, 5 toilets, 4 showers; 1 toilet
Classrooms with labs	0	N/A	N/A
Teacher prep space	0	N/A	N/A
Gear storage/distribution	1	1,663	N/A
Site office	1	380	N/A
Maintenance/Utilities	0	N/A	N/A
NPS administration	0	N/A	Offsite
Outdoor amphitheatre	0	N/A	N/A
Total Non-Living Space		4,280	
Parking Lots	1		20 vehicle spaces

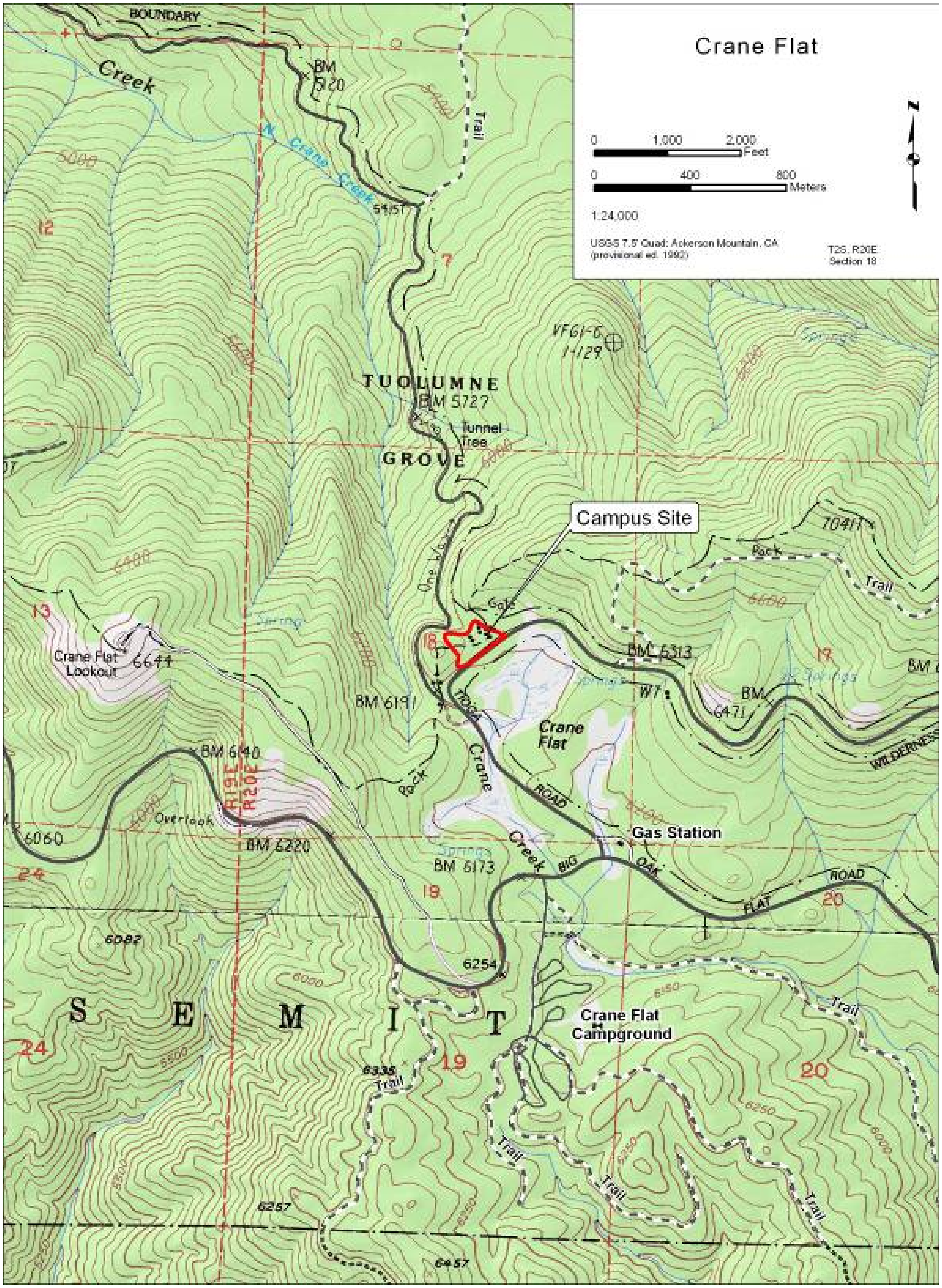

Figure 2-3. Environmental Education Campus Site at Crane Flat and Vicinity

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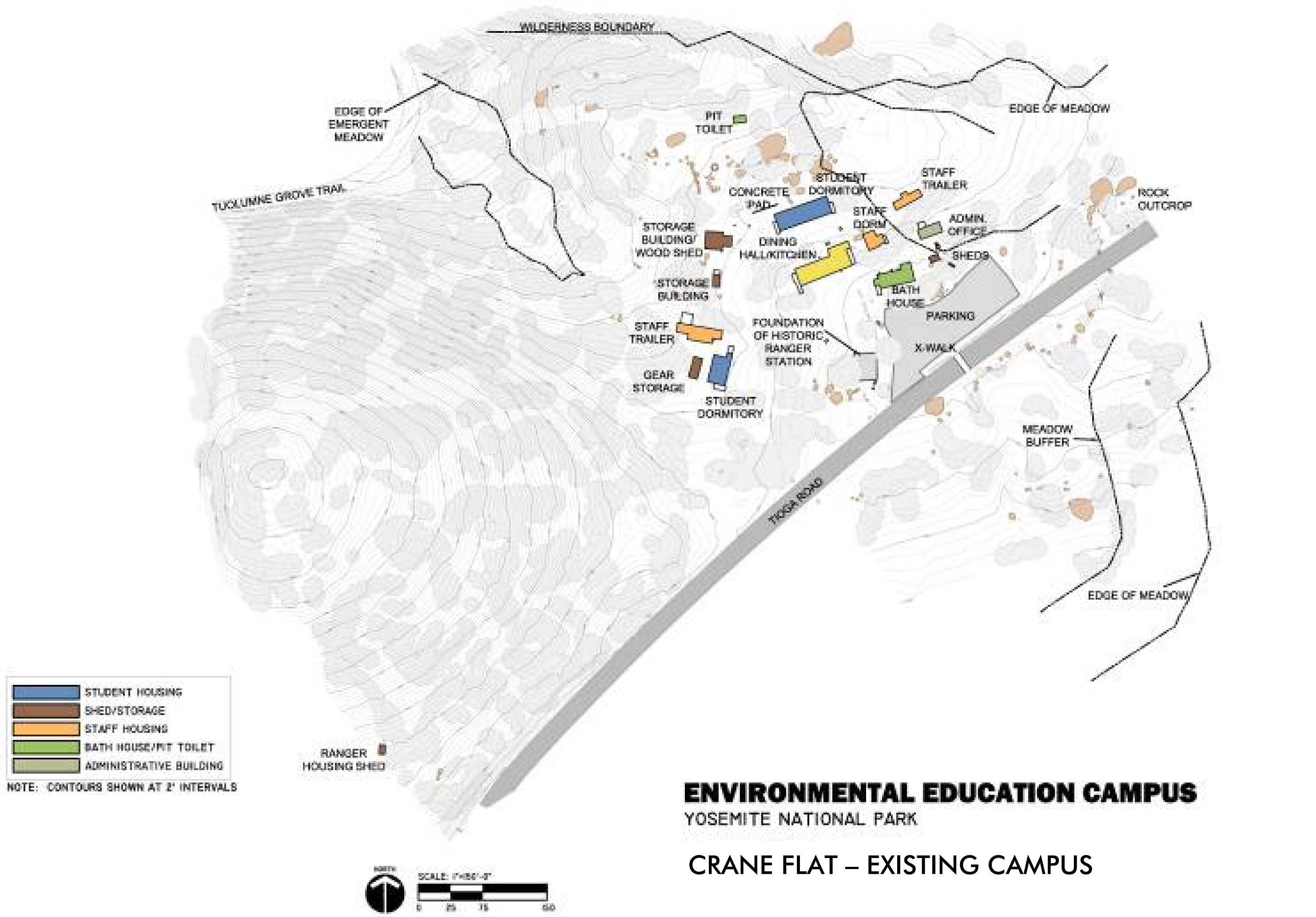

Figure 2-4. Site Layout of Environmental Education Campus at Crane Flat under Alternative 1 – No-Action

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Utilities

There would be no modifications or improvements to site utilities (water supply, wastewater, energy) under this alternative. However, as part of a separate project, the entire Crane Flat water supply system is being repaired because leakage from the existing system accounts for 70% of the daily water demand. Potable water is piped to the campus from an offsite storage tank. Wastewater is treated by an advance onsite treatment system and disposed to leach fields. Energy is provided by an offsite 50- kilowatt generator and propane. Most of the buildings on campus are heated by woodstove; approximately 12 cords of wood are used for heating from October to May.

The campus' water supply is pumped from an existing NPS groundwater well located in a portion of Crane Flat meadow just south of the campus. This well also provides the current water supply for the Crane Flat visitor services at the gas station, Youth Conservation Corps (YCC) camp, Ranger Station and residence, and campground. Groundwater is piped to a 50,000- gallon storage tank east of the campus along Tioga Road. The potable water is piped to the campus buildings via a network of underground pipelines. The current average daily domestic water demand for the campus is 1,656 gallons per day (gpd). With water conservation measures already in place, students use an average of 18 gallons per person per day. No water is used for landscaping or irrigation on the campus.

The Yosemite Institute has recently worked with the National Park Service to disconnect and restore the site of an abandoned leach field, and has brought the current septic system up to code. Under a separate project, the Crane Flat area water system is being replaced and upgraded by the National Park Service. The National Park Service is initiating water conservation measures area- wide and would continue to monitor Crane Flat Meadow well draw- down to avoid adverse affects to the fen system.

Under Alternative 1, water demand would remain the same. No new water sources would be located, and no offsite pumps, plumbing, or storage features would be constructed. Existing standard plumbing fixtures would remain, and no additional fire safety equipment, such as fire sprinklers, would be installed. No water storage tank exists onsite that might provide additional fire protection. The septic system was recently replaced, and an old leach field that was found leaking on site was disengaged and removed. The new septic system is still difficult to maintain and must be pumped during high water events because of the soils and high water table. The existing septic system and associated leach fields would remain. Wastewater generation at the current facility is currently 20 gallons per capita day.

Electricity is provided to the campus via a 50- kilowatt generator located in the Tuolumne Grove parking lot. The existing peak electrical demand is 42 kilowatt- hours per day. Propane is supplied by seven 500- gallon above- ground tanks located in the central portion of the campus and provides gas for some interior heating, water heating, and cooking. The existing peak propane demand is 265 gallons per day. Because the campus facilities and users would not change under this alternative, energy demand would remain consistent with existing conditions. Wood- burning stoves would continue to be used as the primary heating source for the dining hall and student dormitories. The existing campus site and facilities are not well suited for sustainable energy production, such as solar panels.

Administration

Campus administrative facilities would remain within a trailer at the current location adjacent to the meadow. The Yosemite Institute would continue to operate administrative offices in Yosemite Valley and the main office in El Portal. Staffing for the environmental education campus currently includes 33 instructors, 10 administrative personnel, and seven support staff. The campus provides permanent housing for two staff persons in modular units. An additional six temporary staff beds, used during periods of inclement weather or due to programming requirements (i.e., evening programs), are located in a one- story building on site. Approximately 48 employees are housed in El Portal, Foresta, Midpines, and Yosemite West units that are owned or rented by the Yosemite Institute or privately owned or rented by staff members. In the short term, administration of the campus would not change, and operations and use would be similar to existing conditions.

Environmental Education Program

Crane Flat differs significantly from Yosemite Valley in both climate and surroundings. Crane Flat is approximately 2,000 feet higher in elevation than Curry Village and receives much more snow than the floor of Yosemite Valley. Commonly, a significant snowpack at Crane Flat encourages study of winter ecology and adaptations. The difference in elevation between the two sites also provides students exposure to variations in vegetation and wildlife communities. A summary of trails used is presented in Table 2- 2.

Table 2-2. Crane Flat and Yosemite Valley Trail Use under the No-Action Alternative

Trail Name	Yosemite Institute Groups per Day (Maximum)	Mileage—Round Trip
Tuolumne Grove	5	3
Crane Flat Fire Lookout	5	3
Crane Flat Meadow	5 (seasonal closure for wildlife)	<1 (Not used March 1 to September 1)
Yosemite Valley Floor	26	1-11 miles
Yosemite Falls	6	9
John Muir Trail (Mist Trail to Vernal and Nevada Falls)	7	5 to 9

Transportation

The campus lies just north of Tioga Road and just east of the Tioga Road/Big Oak Flat intersection. Buses carry students to the campus from surrounding communities and also between accommodations in Yosemite Valley (formerly Curry Village) and Crane Flat. Tioga Road is closed from October to May because of snowfall and thus for most of the year is closed while students are at the campus.

ALTERNATIVE 2: CRANE FLAT REDEVELOPMENT

Under Alternative 2, the Yosemite Institute would redevelop the Crane Flat campus, providing a program that better serves the combined missions of the Yosemite Institute and Yosemite National Park and that would enhance educational programs and opportunities. Two historic buildings would remain, two would be removed, and a sustainable, energy- and water- efficient campus facility that would further facilitate the Yosemite Institute's high- quality, immersive, multi- day educational experiences for students would be constructed. The campus would meet all current health, safety, and accessibility standards and would be designed to be sustainable and ecologically sensitive to reduce impacts to natural and cultural resources.

Campus Character and Site Design

Figure 2-5a. Forest at Crane Flat

Figure 2-5b. Crane Flat Campus

The new Crane Flat campus design was inspired by its rustic forested setting within Yosemite National Park (Figure 2- 5). As previously mentioned, the site is heavily forested, with numerous large conifers such as sugar pine, incense cedar, and white fir providing shade and some cover among the various buildings. This would also be the case under Alternative 2.

A redeveloped environmental education campus at Crane Flat would employ sustainable design, using the latest "green" technologies (see Elements Common to Action Alternatives). However, because of the heavily forested setting on the slightly north- facing slope, this design does not employ any solar power. The site would offer students new learning opportunities not currently available, particularly in regards to energy conservation. The redeveloped campus would involve changes in student circulation, facility type and location, and the number of overnight accommodations (Figure 2- 6). Most buildings would be removed and replaced, though two structures of historic significance would be retained: the current bathhouse and an oil shed.

The Crane Flat campus would include 14 new structures with approximately 34,575 square feet of interior space and two parking lots that can accommodate 30 vehicles (Table 2- 3). The redeveloped campus footprint would be approximately 6 acres. New facilities that would be constructed at the Crane Flat site include six student dormitories that would accommodate 154 students, two bathhouses, a kitchen and dining hall, a classroom and teacher preparation building, a gear storage and site office, an apartment building for three staff, a facility management building, and a luggage shelter. A staff bunkhouse would be located at an existing historic building at the campus.

The new campus would meet NFPA standards. Fire lanes and emergency access would include three entrances to the campus from Tioga Road. Major paths reaching dormitories would be wide enough to accommodate emergency fire vehicles, as described in the Elements Common to Action Alternatives section.

Table 2-3. Summary of Alternative 2: Crane Flat Redevelopment

Program Element	Quantity	Gross Square Footage	Capacity
Standard cabins (no baths)	5	10,125 total	126 beds
Cabins with baths	1	2,500	28 beds
One-bedroom apt (staff)	1	630	1 bed
Studio apts (staff)	2	960 total	2 beds
Bunkhouse (staff)	1 (existing)	950	11 beds
Total Living Space		15,165	154 students/14 staff
Arrival shelter	1	400	48 participants
Dining hall	1	6,950	112 @ dining room 20 @ dining annex
Bathhouses	2	3,560 total	68 each; 136 total
Classrooms with labs	3	4,050 total	45 participants
Teacher prep space	1	650	16 teachers
Gear storage/distribution	1	2,100	N/A
Site office	1	650	4 staff
Maintenance/Utilities	1	1,050	N/A
NPS administration	0	N/A	Offsite
Outdoor amphitheatre	1	N/A	168
Total Non-Living Space		19,410	N/A
Parking			30 vehicle spaces

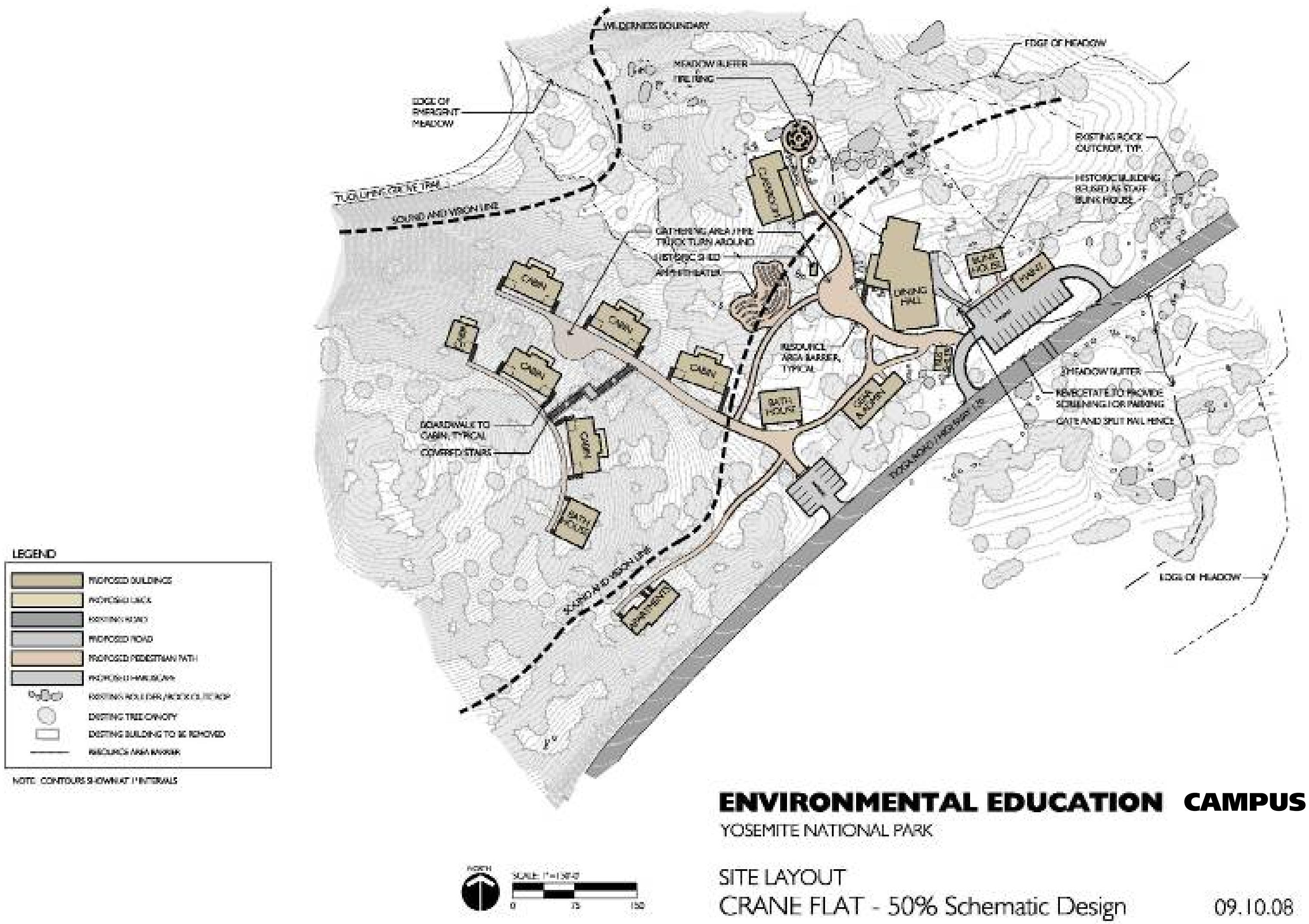

Figure 2-6. Site Layout of Redeveloped Crane Flat Campus under Alternative 2

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Americans with Disabilities Act Accessibility

The redeveloped campus would incorporate accessible low- gradient paths and would largely comply with the ADA and NPS DO 16A (Accessibility for Employees and Job Applicants) and DO 42 (Accessibility for Park Visitors). Of the new buildings, just three cabins and one bathhouse would not be universally accessible (because of the steep slopes on which they would be built). Site design would incorporate accessibility into the routes within the site, parking spaces, passenger loading zones, building entrances, and ground and floor surfaces, as required. Alternative 2 provides on- grade access to all but four buildings; steep terrain and other site characteristics prevent universal access from being accomplished.

Utilities

Under this alternative, some modifications or improvements to site utilities would be made, including installation of fire sprinklers. Irrigation would not be used except possibly in the short term to establish initial plantings. Under Alternative 2, peak domestic winter water demand for the campus is estimated to 8,610 gpd; summer demand would be half this amount. Water harvesting would occur using building rooftops and small storage tanks. The existing 50,000- gallon tank is not adequate for fire suppression. An additional 150,000- gallon tank would need to be constructed to provide adequate fire suppression.

The septic system was recently replaced, and an old leach field that was found leaking onsite was disengaged and removed. The new septic system is still difficult to maintain and must be pumped during high water events because of the soils and high water table. The existing septic system and associated leach fields would be abandoned. A new advance wastewater treatment system would be constructed with 24,000 gallons of septic tanks and several textile media filter treatment cells before disposal to shallow pressure- dosed leach fields or drip irrigation lines. The leach fields would be located adjacent to the proposed wastewater treatment plant and would be off- limits to students and most staff. Based on the water conservation features of the new campus and a study that assumed a maximum of 154 students and 14 staff is the actual total), peak wastewater generation would be approximately 6,231 gpd. Summertime flows would be half that amount because of the lower occupancy.

The peak winter electrical and propane demand is estimated to be 140 kilowatt- hours per day and 638 gallons per day (gpd), respectively. The peak summer electrical and propane demand is estimated to be 70 kilowatt- hours per day and 319 gpd, respectively. The campus at Crane Flat is too shaded by trees to provide sufficient solar access. Propane would be supplied by above- ground tanks located in the central portion of the campus.

Administration

Campus administrative facilities would be situated closest to the parking lot and road in a site office, but set back further from the meadow than the existing administrative facilities. Staffing for the environmental education campus would include 33 instructors, 10 administrative personnel, and seven support staff. The campus would provide permanent housing for three staff in studio and one- bedroom apartments. An additional 11 temporary staff beds would be located in a historic building, currently the bathhouse, which would be remodeled to be used as a staff bunkhouse. Approximately 48 employees would be housed in El Portal, Foresta, Midpines, and Yosemite West units that are owned or rented by the Yosemite Institute or owned or rented by YI staff. Administration of the campus would not change, and operations and use would be managed similar to existing conditions, except the redevelopment of the site would be able to accommodate more students and staff.

Environmental Education Program

Overall, the redevelopment of the campus at Crane Flat and adjustments to the program in Yosemite Valley would accommodate a similar number of students but with fewer in the Yosemite Valley. There would be maximum capacity of 420 students in the program, six more than the historical average maximum but 74 fewer students in the Yosemite Valley compared to the No- Action Alternative. Under this alternative, 154 students would be housed at the Crane Flat campus and 266 in Yosemite Valley (compared with the historical average maximum of 340 under the No- Action Alternative). The new facilities would include a classroom and dining hall that would be better suited to an effective indoor educational experience than the current campus.

The trails used around the campus at Crane Flat would be the same as those used under the No- Action Alternative (Table 2- 2). Some other aspects of the environmental education program would also be the same, but there would be additional programs and educational opportunities based on the sustainable and energy efficient design of the new campus. American Indian tribes would be invited to collaborate on cultural heritage curriculum. Passive learning would be encouraged through signs (e.g., signs marking recycled materials, native plants, solar cells, and energy meters) on the new campus that would be augmented by traditional experiential education by staff.

Transportation

The redeveloped campus would remain in its existing location, just north of Tioga Road and just east of the Tioga Road/Big Oak Flat intersection. Buses would carry students to the campus from surrounding communities and also between accommodations in Yosemite Valley (formerly Curry Village) and Crane Flat. Tioga Road is closed from October to May because of snowfall and thus for most of the year is closed while students would be at the campus. With an increase of approximately 78 students from the current maximum program size at Crane Flat, bus and vehicle traffic would increase in and around Crane Flat but would decrease in Yosemite Valley as fewer students would be housed there. A larger parking lot would be constructed to accommodate this increase in vehicular traffic.

Redevelopment

Under this alternative, redevelopment of the campus at Crane Flat would begin in the fall of 2010. The expected duration of redevelopment would be 12 to 18 months. Yosemite Institute would discontinue environmental education programs at the Crane Flat facility during campus redevelopment. The Yosemite Institute would continue to operate the Residential Field Science Program at Curry Village facilities (Boystown) in Yosemite Valley (existing condition) and at facilities rented from the concessionaire at the Wawona Hotel in Wawona. Because the hotel is closed for the majority of the period between the beginning of December through mid- March, YI programming would be reduced to rented facilities at Curry Village only.

Phase 1 – Redevelopment Setup

Vehicles and workers required for campus redevelopment would access the site from Tioga Pass Road and would enter the park via Highway 41, Highway 140, or Highway 120. The site would be fenced to prevent public or private spectators from entering the construction zone. Interpretive displays and information regarding the proposed project would be made available at the Yosemite Valley Visitor Center and/or the Tuolumne Grove trailhead. Temporary erosion control measures and other measures to protect native foliage and land features would be installed prior to site- disturbing activities. A berm planted with native vegetation (such as willows and/or cherry shrubs) would be constructed between Tioga Road and the parking area to create a visual barrier and to improve habitat connectivity between meadow areas.

Phase 2 – Facility Construction

Phase 2 is scheduled to begin in 2010 and continue for approximately 18 months. This phase includes demolition of existing structures and the simultaneous construction of the following facilities:

- Dormitories
- Dining/kitchen building
- Outdoor dining deck
- Entry/administration building
- Gear storage/laundry building
- Classrooms
- Laboratories
- Wastewater treatment plant
- Mechanical/electrical/maintenance/storage building
- Parking
- Amphitheater
- Viewing platform
- Elevated site walkways

Construction Staging. Staging for equipment access and storage would be contained within the existing campus site. In addition, Pohono Quarry, located at the west end of Yosemite Valley, to the north of Pohono Bridge and El Portal Road, would be established as a secondary staging area for the storage of equipment that could be used infrequently during project activities (i.e., not needed on a daily basis), and for storage and sorting of material removed from the site that would be reused, recycled, or disposed (outside the park). Most materials would be delivered to the site as needed with little to no stockpiling on site. All concrete would be transported by truck to the site as needed, and use of a concrete batch plant is not anticipated.

Construction Equipment. The types and quantities of equipment required would vary with the type of work being performed. The typical daily average equipment used on site would include two forklifts, two backhoes, one excavator, two bobcats, and one dump truck. During foundation and underground work, one to two concrete trucks and one concrete pump would be required. During framing and roofing, two forklifts and one crane and associated scaffolding would be required. Assorted pickup trucks and delivery vehicles would be present onsite throughout construction. A field office trailer, temporary restrooms, and storage containers would be located onsite throughout construction.

Construction Personnel. The size of the construction crew would vary with the type of construction being performed. Crew size would range from a minimum of approximately 25 to a maximum of approximately 75 employees. An administration staff consisting of a project manager, superintendent, foreman, and project clerk would add an additional four construction staff.

Number of Construction Employee Trips and Duration of Stay. Employee trips to the site would range from a minimum of 10 vehicles per day to a maximum of 32 vehicles per day. Most traffic would arrive early in the morning and depart in the early to late afternoon. The construction schedule would be dependent upon weather and other variables. Carpooling would be encouraged to reduce vehicle traffic on park roads.

Construction crews would be housed in onsite trailers and private housing. Inclement weather could necessitate occasional overnight stays on site or elsewhere within the park.

Phase 3 – Post- construction Site Restoration and Cleanup

Following redevelopment, the landscape of the environmental education campus development area would be revegetated and recontoured (Figure 2- 3). Existing and historic vegetative communities would be re-established and enhanced within the project area using an applied ecological approach to revegetation, in consultation with associated American Indian tribes. Revegetation and landscaping at the site would emulate natural vegetation succession, native community structure, and species composition. A revegetation and monitoring plan would be developed with the support and approval of the Vegetation and Ecological Restoration branch of the park's Resource and Management Science division. Exposed soil would be covered with a combination of locally acquired native duff and forest litter from adjacent areas to provide immediate groundcover and facilitate natural revegetation of the site. Salvage vegetation would be used to the extent possible. Equipment used to perform restoration activities could include excavators, bulldozers, loaders, cranes, dump trucks, pumps, and water trucks.

Following revegetation, all construction- related materials and equipment would be removed from the site. Consistent with the NPS's *Guiding Principles of Sustainable Design* (1993b), all infrastructure materials removed from the site (e.g., concrete, rock rubble, wood) would be recycled to the extent possible, at an approved and licensed facility, or reused within the park. No metal, concrete, or timber materials would be disposed within the boundaries of Yosemite National Park. All project materials that would not be reused within the park would be removed from the site upon completion of the project.

ALTERNATIVE 3: HENNESS RIDGE CENTER (PREFERRED)

Under Alternative 3, following the construction of the new center, Yosemite Institute operations and activities would cease at Crane Flat. Yosemite Institute staff and student lodging at Crane Flat would be discontinued. Alternative 3 would establish a new campus location and program at Henness Ridge.

Center Character and Site Design

Figure 2-7. Alternative 3 Henness Ridge Center Site (Coniferous Forest with recent Prescribed Burn)

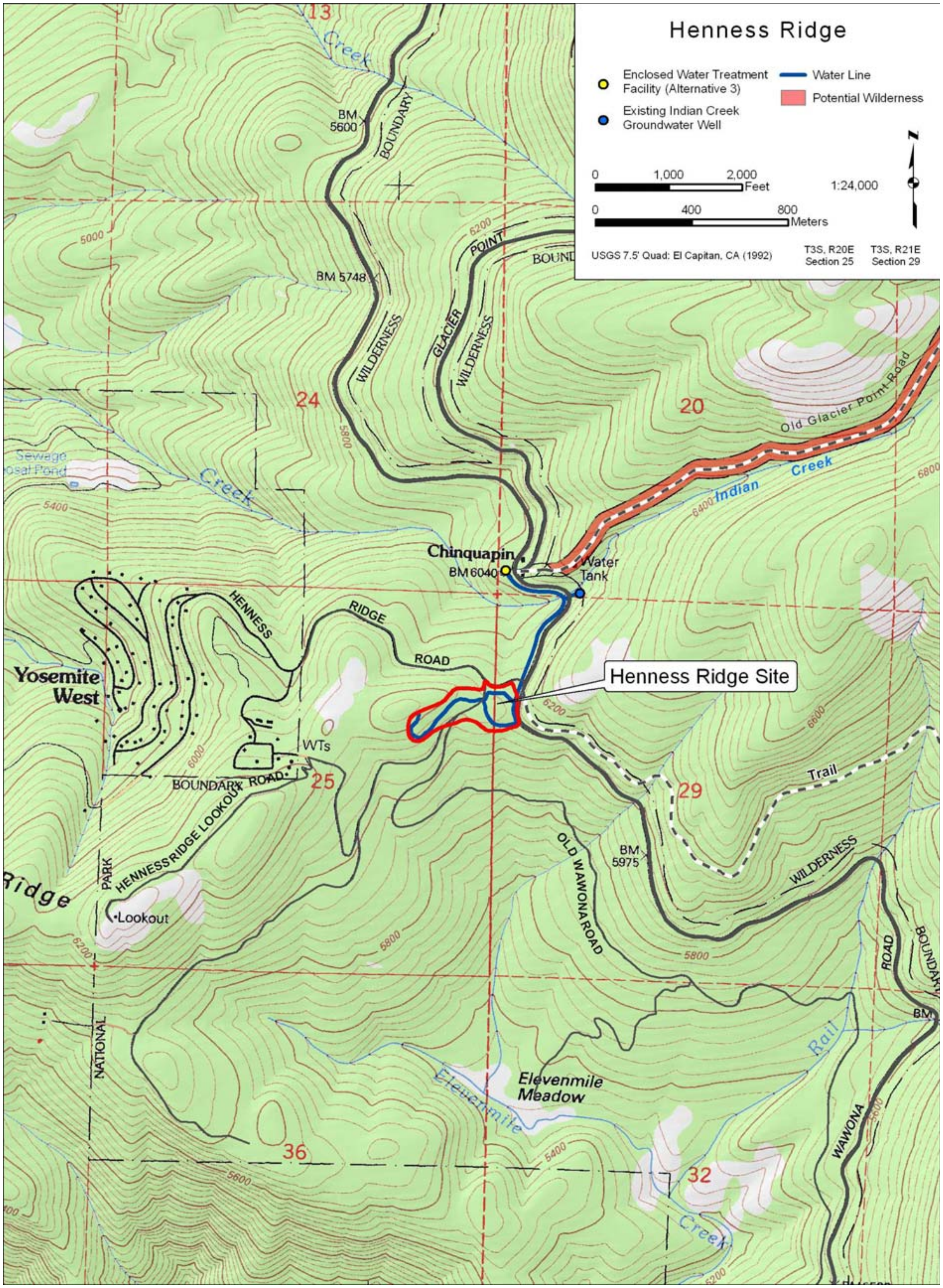

Figure 2-8. Henness Ridge Site

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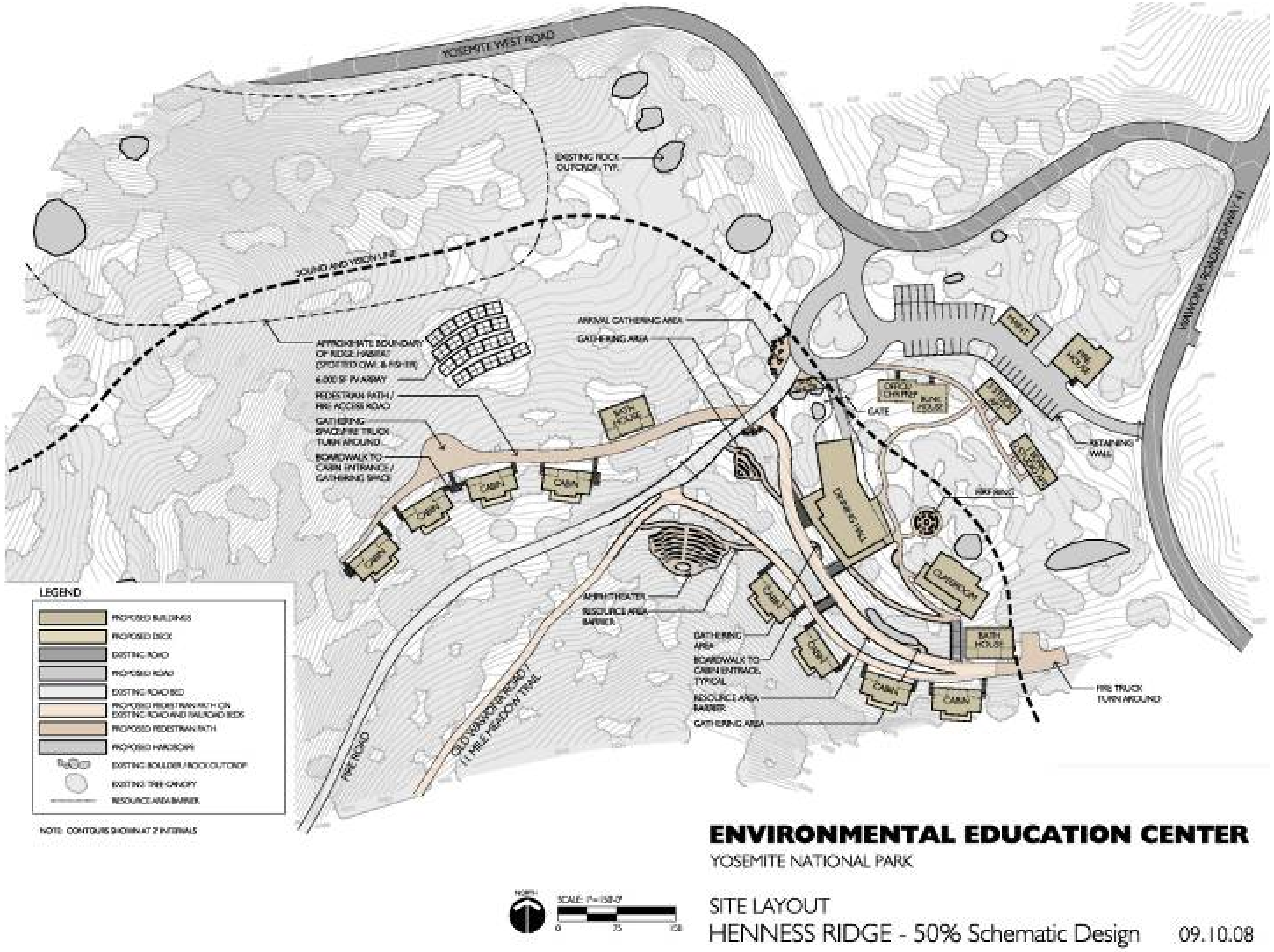

Figure 2-9a. Site Layout of Proposed Henness Ridge Center under Alternative 3 (50% Design)

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Figure 2-9b. Site Layout of Proposed Henness Ridge Center under Alternative 3 (95% Design)

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Under Alternative 3, a new environmental education center would be constructed at Henness Ridge, just southwest of the intersection of Henness Ridge Road and Wawona Road (Figures 2- 7 to 2- 9). This site slopes to the southwest and is forested with a few openings that afford distant views of the South Fork of the Merced River canyon. The mixed- conifer forest includes white fir, incense cedar, sugar pine, Jeffrey pine, and ponderosa pine.

A recent prescribed burn has resulted in numerous fire scars and some tree mortality. The campus would employ sustainable design, using the latest "green" technologies, including solar panels and geothermal heating, and would offer students new learning opportunities not currently available. The Crane Flat campus location would be restored to natural conditions.

Facilities that would be constructed at the Henness Ridge site include living and non- living space. Living space consists of eight student cabins (for 224 students), one instructor bunkhouse (for 16 instructors), and a four- unit staff apartment building (for 4 staff) on 15,518 square feet (Table 2- 4). Non- living space buildings consist of an arrival shelter, dining hall/kitchen, two bathhouses, classroom, staff prep space and office, maintenance building, and NPS fire house on 21,470 square feet (Table 2- 4). Other non- living space includes an outdoor amphitheatre, solar array, water tanks, and parking lot on 45,164 square feet. Developed areas have been consolidated during the design process to minimize the campus footprint. Examples of consolidation include: accommodating instructors in bunks, placing gear storage under the dining hall, and making more efficient use of space in all buildings. The total new campus/fire house footprint, including open space within the campus area, would be approximately 16 acres.

The new campus would meet NFPA standards. A new fire house would be onsite, and fire lanes and emergency access would include three exits from the campus: one onto Henness Ridge Road and two onto Wawona Road. Major paths reaching cabins would be wide enough to accommodate emergency fire vehicles.

Americans with Disabilities Act Accessibility

The campus would be universally accessible (with on- grade access to every building), using a network of low-gradient paths and would comply with ADA and NPS DO 16A (Accessibility for Employees and Job Applicants) and DO 42 (Accessibility for Park Visitors). Site design would incorporate accessibility into the routes within the site, parking spaces, passenger loading zones, building entrances, and ground and floor surfaces, as required.

Table 2-4. Summary of Alternative 3: Henness Ridge Center

Program Element	Quantity	Gross Square Footage	Capacity
Cabins (students with chaperones)	8	11,904	224 beds (28/cabin)
Bunkhouse (instructors)	1	1,476	16 beds
Apartments (staff) One-bedroom apartment	1	630	1 bed
Studio apartments	3	1,508	3 beds
Total Living Space	13	15,518	224 students/16 instructors/ 4 onsite staff= 244
Arrival Shelter	1	475	48 participants

Table 2-4. Summary of Alternative 3: Henness Ridge Center

Program Element	Quantity	Gross Square Footage	Capacity
Dining Hall/Kitchen	1	6,900	112 @ dining room 20 @ dining annex
Gear storage (under Dining Hall Building) and distribution	N/A	1,764	N/A
Bathhouses	2	4,086	112 each; 224 total
Classroom (3 rooms with labs)	1	3,582	60 participants
Staff Building Teacher prep space	1	383	16 teachers
Site office	1	608	4 staff
Maintenance	1	1,080	N/A
NPS Fire House	1	2,592	N/A
Total Non-Living Space (Buildings)	9	21,470	
Outdoor Amphitheatre	1	2,000	244
Solar array (ground-mounted)	1	12,470 (max)	N/A
Water Tanks	2	904	N/A
Parking Lot	1	29,790	39 vehicle spaces
Total Non-Living Space (Other)		45,164	

Utilities

The center at Henness Ridge would be supplied with water from the Chinquapin area, electricity from a new onsite solar array, heating from a geothermal system, propane tank, and wood burning stove/fireplace, and telephone/internet from an existing line. The campus electricity system would be connected to the Pacific Gas and Electric Company (PG&E) grid.

Water

Under Alternative 3, the groundwater well at Indian Creek would supply the campus with water. The treatment and control facilities would be built in the existing Chinquapin Ranger Station garage, which is a historic structure, to treat the groundwater so it would be appropriate for human consumption and use. Minor alterations would be made to the exterior of this historic structure in modifying it to treat water (e.g., venting, piping, electrical boxes and conduit, antennae, etc.). In addition, the historic road (Old Glacier Point Road) from Badger Pass along Indian Creek would be converted to a trail and be eligible for 64 acres of new designated Wilderness. The electric and telephone lines running along the edge of Wawona Road from Chinquapin to Henness Ridge would be protected during the installation of the proposed water main along the same Wawona Road alignment. Pervious surfaces within the campus would be maximized where feasible to improve water filtration.

The peak winter water demand is estimated at approximately 11,480 gpd; the peak summer demand is estimated at 5,740 gpd. At- grade water tanks would be constructed on an elevated slope west of the proposed campus (but below ridgeline) to provide adequate water storage and pressure for both domestic service and fire suppression. The minimum amount of water storage required for both domestic water and fire protection would be 200,000 gallons based on a fire flow of 1,500 gallons per minute. Two 100,000 gallon water storage tanks, each approximately 24 feet in diameter by 30 feet in height would be placed at 6,245 feet elevation on the slope about 100 feet above the campus. Two tanks, rather than one, provide the option of shutting down one for maintenance when necessary, while still maintaining water supply to the campus. Approximately 1,100 feet of 1- inch service lines and 1,300 feet of 8- inch main would distribute water on the campus (Figure 2- 10). Approximately 1,200 feet of 2.5- inch pipe and 2,900 feet of 8- inch main would be built along Wawona Road to distribute water from the water treatment plant to the campus. Approximately 1,100 feet of 10- inch transmission main would be installed to the storage tank to serve the Chinquapin/Henness Ridge area.

An advanced onsite underground wastewater treatment system would be installed to treat the wastewater before disposal. The treatment process includes a septic tank of approximately 32,000 gallons (3 days of retention time) and an array of recirculation fixed film growth media filter cells. Multiple drain fields with perforated piping (2 foot by 3 foot trenches with ¾ inch gravel) would be installed to allow for seasonal rotation of soil absorption disposal fields. These would be installed just southeast of the parking lot and west of Wawona Road and/or on the slope between the entrance turnaround and the solar array. The project would reuse graywater from plumbing fixtures in the two bathhouses for flushing of toilets and urinals. This would reduce the overall consumption of potable water and generation of wastewater. With these water conservation features at maximum occupancy, the campus wastewater generation would be approximately 25 gallons per capita day or approximately 6,350 gpd for average daily flow and 10,800 gpd for maximum daily flow. Summertime flows would be half that amount because of the lower occupancy, or 3,675 gpd.

Electricity and Heating

The Henness Ridge site is not currently connected to electricity, although there is an underground electrical line that runs diagonally through the site. The campus would connect to the existing Pacific Gas and Electric Company (PG&E) 22 kV distribution line running along an existing utility corridor on Henness Ridge Road and Wawona Road. The line serves Chinquapin, Badger Pass ski area, and Yosemite West. The park is coordinating with PG&E to determine the peak load from development at Henness Ridge.

The PG&E distribution line would provide reliable commercial electrical power as well as an opportunity to send excess renewable energy from the photovoltaic array (PV) system at the campus to the electrical grid. PV systems, geothermal, and propane would provides HVAC, water heating, and lighting needs with a goal of 'net zero energy' from fossil fuels. A net zero system is based on an annual average. For example, the campus would utilize electrical energy from the transmission grid during cold winter nights, but produce excess power from onsite PV systems on sunny summer days for a total of zero energy from fossil fuels. The NPS is continuing to explore options for an offsite PV system to minimize the area needed by onsite ground mounted solar arrays.

Solar, geothermal, and propane energy systems are described below. The annual power required to supply the campus would be approximately 613,000 to 816,000 kWh, depending on the composition of energy sources. The onsite PV array system would supply up to 67 percent of campus energy needs (excluding propane) while geothermal would supply 25 percent to 33 percent of energy needs.

Photovoltaic (PV) Array System (onsite; ground and building- mounted). The onsite PV array system would be situated on five building rooftops (east bathhouse, classroom, and three cabins) and on ground-mounted poles between the water tanks and campus buildings. The roof- mounted arrays would be limited to buildings with sufficient solar gain potential (at least 65 percent) given the buildings' solar orientation and the existing tree canopy. The ground- mounted solar panels would be placed with similar considerations for solar gain potential and the tree canopy. The array would not track the sun's position, though, because such systems disturb more surface area than the proposed fixed panels. Fixed panels maintain the same angle during the day but retract to a vertical position at night to avoid snow- build up. During summer and sunny days, the solar energy would be converted to electrical power for campus use with any excess power generated being metered and fed back into the PG&E grid to offset periods of limited solar availability, such as nights and the cloudy days of winter. The size of the onsite PV array system would be 12,470 to 18,700 square feet for the ground- mounted component (depending on the possibility of an offsite array system) and 6,780 square feet of roof- top area.

PV Array System (offsite). In order to minimize the disturbance area of the ground- mounted solar array and maximize net solar energy capacity, an additional roof- mounted PV array system may be constructed offsite (such as at a school participating in YI programs in nearby Merced) through a Power Purchase Agreement (PPA) by Yosemite Institute. Electricity generated by the solar array would be metered back to the PG&E power grid to be credited towards YI campus' annual energy consumption. The offsite location would facilitate the net zero energy goals of the project by providing sufficient solar access while also lowering overall installation and maintenance costs and minimizing impacts from tree removal and ground disturbances in Yosemite. The offsite location in the Central Valley (compared to the Henness Ridge site) would maximize solar access throughout the year by providing fewer cloudy days, no snow loads, and no pine litter to cover or damage the system.

Energy associated with the offsite PV array would be accounted for through the PPA. The electricity generated from the PPA constructed green power system would be either used locally or distributed through the commercial transmission grid to other users, thus having the same impact as if constructed at the Henness Ridge – reducing the amount of electrical generated by fossil fuels. The only difference from producing sustainable (green) power onsite as compared to offsite is that 10 percent to 15 percent of offsite electrical power is lost through the transmission/distribution grid because of resistance in electrical lines. However, a solar array of similar size in the Central Valley would benefit from more months per year of sunny weather and generate more power overall to compensate for power lost through transmission.

Geothermal Heat Pump System. A geothermal heat pump system would be constructed to heat the dining hall/kitchen and two bathhouses to lessen the electricity demand. These three buildings account for the largest loads at the Henness Ridge campus. Geothermal heat pump systems use 25 percent to 50 percent less electricity than conventional heating (or cooling) systems. Geothermal heat pumps use the constant temperature of the earth as the exchange medium instead of the outside air temperature. This allows the system to reach high efficiencies on the coldest of winter nights. Approximately 70 percent of the energy used in a geothermal heat pump system is renewable energy from the ground. These systems also run very quietly with no need for an external condenser and fan unit typical of air exchange heat pump systems.

Geothermal heat pumps would be located near each of the three buildings with approximately 25 boreholes spaced 20 feet apart and 300 to 400 feet deep (vertical closed loop system) near each location. The piping would be linked back to each building by horizontal piping, mostly along roads and paths at a depth of 18 to 24 inches.

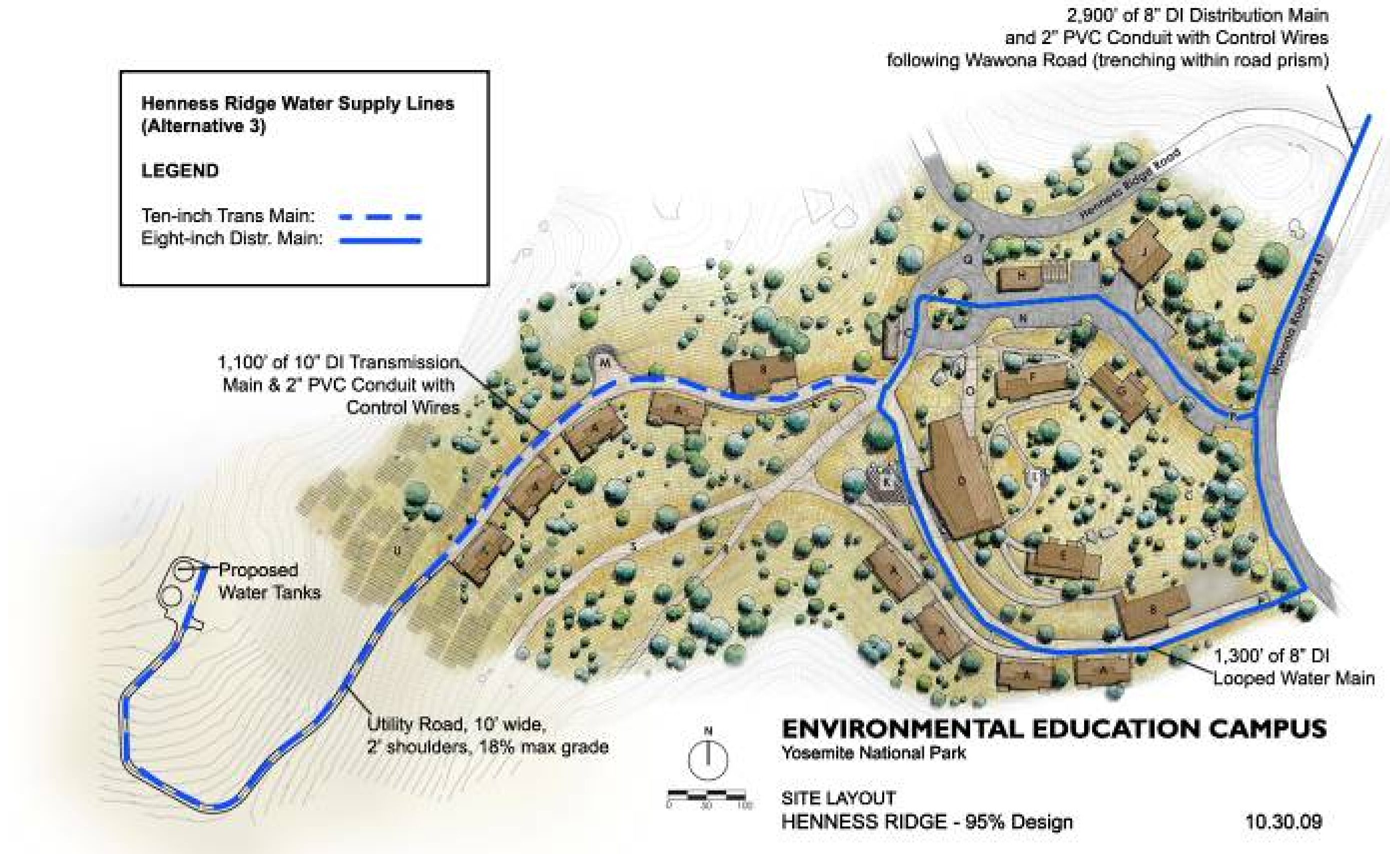

Figure 2-10. Alternative 3 – Henness Ridge Center Water System Supply Lines

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Stove and Fireplace. A high mass wood burning stove will be located in the classroom and a masonry Rumford fireplace will be located in the dining room. These secondary heating units would be used up to five days a week from November to April. Both units are designed to burn more efficiently than traditional stoves and fireplaces. The classroom stove would be lit in the evenings (approximately 2 cords per season) and the dining room fireplace would be lit during the day (approximately 4 cords per season).

Propane Tank and Back- up Generator. One above- ground propane tank would be located near the maintenance building to run the kitchen cooking equipment and for hot water. The propane take would also run a back- up generator if electrical power fails. The tank would be approximately 500 gallons, which would be refilled approximately once every other month in winter.

Telephone and Internet

Telephone service would be extended from the service to Yosemite West and would include a maximum of 25 lines, including the fire station. A data system would be required in the office, fire station, kitchen, and classroom and would be provided by a small system situated in a central location. Internet access would not be installed in the cabins. Television for staff quarters would be accomplished via satellite dish as an owner-installed system.

Administration

Staffing for the Yosemite Institute program (Yosemite Valley and Henness Ridge combined) would include 36 instructors, 10 administrative personnel, and seven support staff. The campus would provide permanent housing for four staff in studio and one- bedroom apartments. An additional 16 temporary staff beds would be located in a staff bunkhouse onsite next to the teacher preparation office and the site office. Approximately 50 employees would continue to be housed in private housing in the vicinity, such as in El Portal, Foresta, Midpines, Wawona, or Yosemite West.

Environmental Education Program

Under this alternative, the total number of students in the park per session would be approximately 490. Under this alternative, 224 students would be housed at the Henness Ridge campus and approximately 266 in Yosemite Valley (approximately 74 fewer students than in historic programming). The new facilities at Henness Ridge would provide indoor and outdoor learning environments that are tailored to teaching and learning. The new dining hall and classroom, as well as the circulation of students during their stay, would significantly improve the students' indoor educational experience. A diversity of trails around the campus at Henness Ridge would provide the environmental education program participants opportunities for exploration (Table 2- 5). Different trails would be used than those used under either Alternative 1 or Alternative 2, including those that enter designated Wilderness just east of the campus site. American Indian tribes would be invited to collaborate on cultural heritage curriculum. Because there would be a fire house onsite, there would be opportunities for students to interact with professional firefighters and to learn about fire ecology and fire- fighting careers. Students could learn about the wildland- urban interface (WUI) and forest management techniques such as prescribed burning, as the area is situated in a fire- adapted mature forest. Passive learning would be encouraged through signs (e.g., signs marking recycled materials, native plants, solar cells, and energy meters) on the new campus that would be augmented by traditional active instruction by staff. In addition, associated American Indian tribes would be participants in developing curriculum relevant to American Indian use of natural and cultural resources in the locales as well as student education on the necessity to continue to protect such resources, perhaps in concert with education hikes or trails.

Table 2-5. Henness Ridge and Yosemite Valley Trail Use under Alternative 3

Trail Name	Yosemite Institute Groups per Day (maximum)	Mileage—Round Trip
Old Wawona Road	3	11
Elevenmile Meadow Spur (seasonal, closed March1 – September 1)	2 (seasonal closure for wildlife)	7
Deer Camp Creek	2	3-7+
Old Railway grade, Halsey Road	3	5
Old Glacier Point Road	2 (seasonal closure for wildlife)	6.4
Fire Lookout via Upper Fire Road	4	3
Mariposa Grove	2	4
Yosemite Valley Floor	19	1 to 11 miles
John Muir Trail (Mist Trail to Vernal and Nevada Falls)	7	5 to 9
Yosemite Falls	6	9
Western Railroad Grade at Henness Ridge	3	5

Transportation

The new campus would be south of Yosemite Valley, along Wawona Road (State Highway 41) at Henness Ridge Road, just south of Chinquapin. Students would arrive by school bus and carpool from communities across the state. School buses would continue to use the three western park entrances (Highway 120, Highway 140, and Highway 41) depending on school location and road conditions and restrictions. Buses would also shuttle students between the Henness Ridge campus and accommodations in Yosemite Valley (Curry Village/Boystown). With an overall program increase, bus and car- pool vehicle traffic would increase in and around Henness Ridge (but cease at Crane Flat) with a decrease of approximately two bus round trips per week in Yosemite Valley (considering 50 students per bus).

Construction

Construction of the environmental education campus at Henness Ridge under this alternative would begin as early as the summer of 2010. The duration of construction is 12 to 18 months with the potential for phasing consolidation. The YI program would cease operations at Crane Flat when the campus at Henness Ridge is operational.

Phase 1 – Setup

Vehicles and workers required for campus redevelopment would access the site from Wawona Road and would enter the park via Highway 41, Highway 140, or Highway 120. The site would be fenced to prevent public or private spectators from entering the construction zone. Interpretive displays and information regarding the proposed project would be made available at the Yosemite Valley Visitor Center. Temporary erosion control measures and other measures to protect native foliage and land features would be installed prior to site- disturbing activities.

Phase 2 – Facility Construction

Phase 2 is scheduled to begin in summer of 2010. This phase includes construction of the following facilities:

- Dormitories
- Dining/kitchen building
- Outdoor dining deck
- Entry/administration building
- Classrooms
- Laboratories
- Wastewater treatment plant
- Mechanical/electrical/maintenance/ storage building
- Parking
- Amphitheater
- Elevated site walkways
- Water system

Construction Staging. Staging for equipment access and storage would be contained near the new site and at Chinquapin. In addition, Pohono Quarry, located at the west end of Yosemite Valley, to the north of Pohono Bridge and El Portal Road, would be established as a secondary staging area for the storage of equipment that could be used infrequently during project activities (i.e., not needed on a daily basis), and for storage and sorting of material removed from the site that would be reused, recycled, or disposed (outside the park). Most materials would be delivered to the site as needed with little to no stockpiling on site. All concrete would be transported by truck to the site as needed, and use of a concrete batch plant is not anticipated.

Construction Equipment. The types and quantities of equipment required would vary with the type of work being performed. The typical daily average equipment used on site would include two forklifts, two backhoes, one excavator, two bobcats, and one dump truck. During foundation and underground work, one to two concrete trucks and one concrete pump would be required. During framing and roofing, two forklifts and one crane and associated scaffolding would be required. Assorted pickup trucks and delivery vehicles would be present on site throughout construction. A field office trailer, temporary restrooms, and storage containers would be located on site throughout construction.

Construction Personnel. The size of the construction crew would vary with the type of construction being performed. Crew size would range from a minimum of approximately 25 to a maximum of approximately 75 employees. An administration staff consisting of a project manager, superintendent, foreman, and project clerk would add an additional four construction staff.

Number of Construction Employee Trips and Duration of Stay. Employee trips to the site would range from a minimum of 10 vehicles per day to a maximum of 32 vehicles per day. Most traffic would arrive early in the morning and depart early to late afternoon. The construction schedule would be dependent upon weather and other variables. Carpooling would be encouraged to reduce vehicle traffic on park roads.

Construction crews would be housed in onsite trailers and private housing. Inclement weather could necessitate occasional overnight stays on site or elsewhere within the park.

Phase 3 – Post- construction Site Restoration and Cleanup

Following redevelopment, the landscape of the environmental education campus development area would be revegetated and recontoured. Existing and historic vegetative communities would be re- established and enhanced within the project area using an applied ecological approach to revegetation, in consultation with associated American Indian tribes. Revegetation and landscaping at the site would emulate natural vegetation succession, native community structure, and species composition. A revegetation and monitoring plan would be developed with the support and approval of the Vegetation and Ecological Restoration branch of the park's Resource and Management Science division. Exposed soil would be covered with a combination of locally acquired native duff and forest litter from adjacent areas to provide immediate groundcover and facilitate natural revegetation of the site. Salvage vegetation would be used to the extent possible. Equipment used to perform restoration activities could include excavators, bulldozers, loaders, cranes, dump trucks, pumps, and water trucks.

Following revegetation, all construction- related materials and equipment would be removed from the site. Consistent with the NPS's *Guiding Principles of Sustainable Design* (1993b), all infrastructure materials removed from the site (e.g., concrete, rock rubble, wood) would be recycled to the extent possible, at an approved and licensed facility, or reused within the park. No metal, concrete, or timber materials would be disposed within the boundaries of Yosemite National Park. All project materials that would not be reused within the park would be removed from the site upon completion of the project.

Restoration of the Crane Flat Campus Site under Alternative 3

Restoration

Under this alternative, YI operations and activities would discontinue at the Crane Flat location, and the campus site would be restored to essentially natural conditions to protect the rich biological diversity and unique natural features of the Crane Flat area. Regionally, within the Sierra Nevada, large montane meadows are increasingly rare due to development, and fens are even more unique and sensitive. Places where mature forest and meadow vegetation overlap ("ecotones") provide highly valuable nesting and foraging habitat for wildlife species of concern, such as the great gray owl and pacific fisher.

Restoration actions would include restoring and enhancing habitat for pacific fisher and great gray owl as well as other species, restoring native vegetation and hydrologic function, and removing visible evidence of the campus while still preserving some historic elements and providing interpretation of the Civilian Conservation Corps (CCC) camp and one historic structure (6017, Oil and Light plant) representative of the park's CCC/Blister Rust camp history. The historic ranger cabin foundation, CCC cabin sites, and terraces would be preserved, and the giant sequoia heritage trees (planted during that era) would be preserved. All campus utilities and infrastructure, including the septic system and associated plumbing, would be removed. The parking lot would be eliminated and the area restored.

Crane Flat Site Restoration Actions under Alternative 3

Campus site restoration would be focused on (and limited to) the area of the existing campus and associated activities (i.e., removed utilities, buildings, the campfire circle, informal trails, parking lot). Mitigation, restoration, and interpretive actions include the following:

- Restore the natural hydrology and native plant communities, including meadows and wetlands.
- Retain and enhance forest canopy closure, density of potential nest/denning snags, and density of leaning trees or snags to protect nesting habitat of great gray owl.
- Retain and enhance denning and resting habitat for Pacific fisher.

- Enhance visitor education and general resource protection by providing a more detailed and accessible interpretation of the area at nearby Tuolumne Grove trail.

NPS staff will prepare a detailed restoration plan to include the following actions:

- **Decompaction of soil:** Soil would be decompacted in the parking areas and other heavily compacted areas with a ripping tool on a bobcat, loosening the soil down to 8 inches. Hand decompaction with shovels would also occur at appropriate sites.
- **Native seed collection:** Various seeds would be collected from the surrounding area and sown into the site.
- **Removal of imported fill material:** Imported fill material would be removed from the site and disposed of properly, outside the park.
- **Removal of old asphalt trail:** This trail consists of old oil cake and would be tested for toxicity prior to removal and disposed of accordingly.
- **Restoration of natural topography:** Heavy equipment may be used to restore the topography around the septic system and a few of the structures where the landscape has been modified to allow the placement of structures. These areas would be restored to match the surrounding topography, to enable natural ground and surface water movement (excluding the historic CCC terraces).
- **Drainages:** Natural surface water drainages would be restored.
- **Invasive plants:** Invasive non- native plants would be surveyed and removed.
- **Planting plan:** Plants, including nitrogen- fixing species would be used to enhance the soils in the parking areas. Tree saplings would be planted or preserved to fill gaps in the canopy.
- **Mulching with local, native materials:** Leaf litter and duff would be collected by hand from the surrounding forest. .
- **Trails:** Social trails and other denuded campus areas would be scarified and revegetated with native plants.

Historic Properties

Following NHPA Section 106 regulations, park staff has prepared a Determination of Eligibility (DOE) for the structures on the Crane Flat campus that are identified as eligible for listing on the National Register of Historic Places (NRHP) in *Yosemite Institute Campus, Crane Flat Historic Resources Assessment* (Environmental Science Associates 2004). The DOE was submitted to the State Historic Preservation Officer (SHPO) for review and consensus with the park's determination that the buildings are eligible for listing on the NRHP. On March 25, 2009, the SHPO concurred that Buildings 6013 and 6017 associated with the CCC from 1934 to 1943 and the Blister Rust Camp from 1946 to 1967, and Buildings 6014 and 6015 associated with the Blister Rust Camp from 1946 to 1967 are eligible for listing on the NRHP (Appendix G).

Consultation with the SHPO and the public is brought about in this document, for the proposed measures to resolve adverse effects as a result of removal of three historic properties (buildings 6013, 6014, and 6015). Standard mitigation measures (SMMs) detailed in Stipulation VIII A of the 1999 PA would be implemented. SMMs include recordation, salvage, interpretation, and NRHP re- evaluation. Historic American Buildings Survey (HABS)/Historic American Engineering Record (HAER) photo- documentation would be completed prior to removal. Historic building materials would be salvaged and recycled to the extent practicable.

Interpretive exhibits that would be developed and installed at the nearby Tuolumne Grove visitor use area, following Stipulation VIII A of the 1999 PA, to enhance visitor education and resource protection. The following themes would be emphasized: Native American prehistory and ongoing traditional use at Crane Flat; historic development during the homesteading era; and CCC and Blister Rust camp history. These exhibits would also highlight the sensitivity and rarity of area ecology, and emphasize protection of the surrounding meadows and wildlife habitat. No significant archeological resources occur within the Crane Flat campus area of potential effects (APE). The remains of the Hurst Saloon, considered a historic property, are located outside of the campus restoration APE and will be avoided.

The Crane Flat Campus is within the larger Crane Flat and Meadow managed by the National Park Service as a potential American Indian Traditional Cultural Property (TCP), as documented in *At the Crossroads: Historical Archaeology and Cultural Landscape Inventory at CA-MRP-1512H/CA-TUO-4240H, Crane Flat, Yosemite National Park, CA* (Pacific Legacy, Inc. 2006). Restoration of the Crane Flat Campus would not change the existing traditional use of the area. Educational opportunities involving contemporary American Indian association with the area would be enhanced.

Future Crane Flat Activities

Recent findings and recommendations from studies regarding sensitive resources would be used to inform any potential future NPS planning for the site and vicinity. Yosemite Institute has already initiated measures at the Crane Flat campus to restrict meadow access and reduce noise and light pollution in their day-to-day campus programs and activities. Similarly, any future administrative or public activities or functions that might take place at Crane Flat should follow these guidelines to protect resources and minimize impacts to sensitive species and habitats, such as the fen and meadows, great gray owl foraging and nesting habitat, or the Tuolumne Grove of Giant Sequoias.

ALTERNATIVES CONSIDERED BUT DISMISSED

The comprehensive alternatives development process, which involved extensive public and NPS staff input over a several year period, ultimately led to the alternatives retained for further analysis in this EIS. Several other site and campus design alternatives were considered, but dismissed from further analysis for the following reasons: (1) they were technically or economically infeasible; (2) they did not meet the purpose and need; (3) they conflicted with other park policies and goals; and/or (4) they would have unacceptable levels of environmental impacts. A discussion of the alternatives development process follows.

Alternatives Development Process

Initial consideration of alternatives for a new campus occurred during the development of an administrative draft EIS that was reviewed by YI and NPS staff in May of 2003. Comments received on this draft indicated that there were mounting resource concerns at Crane Flat, alternatives were too limited, and that further resource studies and expansion of alternatives were warranted. Three public workshops were subsequently held over a several year period to aid in the development of appropriate alternatives to be considered in a final environmental analysis.

2004 Choosing by Advantage Workshop

A Value Analysis and Choosing by Advantage (CBA) workshop was conducted for the Environmental Education Campus Development Program at Crane Flat on April 20 and 21, 2004, in El Portal, California. The value analysis study included two evaluation categories: the first focused on alternative sizes of the proposed facility (number of overnight beds), whereas the second concentrated on alternative forms or site layouts for the proposed development. The value analysis study followed the standard phases and format in the Value

Analysis Job Plan, as recommended by the Development Advisory Board. A group of representative stakeholders, consultants, and subject matter experts attended. Following the workshop, a Yosemite National Park Management Team meeting was held on May 13, 2004, to review. The primary purpose of the value analysis study was to refine and evaluate proposed alternatives resulting in recommendations for further design development and analysis.

2006 Choosing by Advantage Workshop (Campus Site Alternatives)

A second CBA workshop was held on April 11 and 12, 2006. Participants included resource and management staff of Yosemite National Park and YI representatives. The 2006 workshop was set up to study 11 possible locations. The goal was to identify viable sites for the campus other than Crane Flat. Campus size and costs were not considered during this planning effort. Each possible location was evaluated and ranked using seven factors (Table 2- 6).

The process began by presenting a short matrix consisting of three identified critical dismissal factors. A location that was identified as having the dismissal characteristics would be left out from the beginning to focus efforts on more feasible locations. The three critical dismissal factors included irreconcilable conflicts with laws or regulations, irreconcilable conflicts with park plans or policies, and lack of educational opportunities.

Of the 11 alternative locations evaluated during the CBA workshop, Henness Ridge was rated as the most desirable location because it scored the highest on most factors. The next most highly ranked alternative locations included Ransom Ranch, Wawona North, and Crane Flat. The remaining seven locations were either dismissed during the CBA workshop or received comparably low scores. Two sites (Wawona South and Upper Henness Ridge) were eliminated early in the process, for not meeting the purpose and need, or conflicting with existing park regulations and policies.

Figure 2-11. Project Management Leading 2006 CBA Workshop

Table 2-6. Scoring of Site Alternatives from the 2006 Choosing by Advantage Workshop

Critical Factors	Crane Flat	Foresta	Grouse Creek	Hazel Green	Henness Ridge (Sandlot)	Hodgdon Meadow Woodyard	McCauley Ranch	Ransom Ranch	Wawona North (Admin Zone)
1. Protect Cultural & Natural Resources	49	39	142	102	289	169	67	266	229
2. Maintain & Improve Cultural & Natural Resources	11	2	3	5	10	5	7	9	8
3. Visitor Services & Educational & Recreational Opportunities	383	225	165	125	420	157	209	339	237
4. Protect Public Safety, Health & Welfare	35	17	15	15	26	29	6	2	23
5. Improve Operational Efficiency & Sustainability	40	57	12	7	84	24	58	62	77
6. Protect Employee Health, Safety & Welfare	3	5	4	2	8	7	5	3	6
7. Provide other Advantages to the National Park System	52	81	111	151	276	82	51	40	78
Total	573	426	452	407	1113	473	403	721	658

Site Alternatives

Several alternative campus locations were considered during the 2004 and 2006 planning efforts. This section discusses the alternative locations that were previously considered but dismissed from further analysis for a variety of reasons. Alternative locations initially suggested in 2004 as part of the original planning effort by the National Park Service included Yosemite Valley, El Portal, Wawona, Foresta, and near park entrances. Additional sites considered during the 2006 workshop included Grouse Creek, Hogdgon Meadow Woodyard, McCauley Ranch, Wawona North (Administrative Zone), Hazel Green (on private land outside of the park), and Ransom Ranch (on private land outside of the park).

Figure 2-12. 2006 CBA Participants

The CBA participants considered 11 locations within and adjacent to the park for campus site suitability.

Yosemite Valley

The Yosemite Institute has lodged students overnight in Curry Village since the program's inception in 1971. Constructing a complete new campus in Yosemite Valley was briefly considered but dismissed because it would conflict with the goals of the NPS *General Management Plan* (1980) to reduce crowding and facilities in Yosemite Valley. YI continues to use NPS tent cabins in Curry Village (and Boystown) on the floor of Yosemite Valley to house many program participants for part of their session, as they partake in programs in and around Yosemite Valley. The accommodations are operated by the park's concessionaire, and rented by the concessionaire to YI under three- year agreements.

El Portal

The El Portal Administrative Site, authorized by Congress in 1958, is designated as park headquarters and serves as the primary park administrative site. It is along the Merced River several miles west of the Arch Rock Entrance. The NPS *General Management Plan* (1980) calls for the development of an information and reservation station, commercial services (e.g., food, gas, bank), day- visitor parking, and possible expansion for staging. Development of an environmental education campus at El Portal for the purpose of a permanent environmental education program does not fit within the facilities previously identified and would be inconsistent with the direction provided in the NPS *General Management Plan* (1980).

Wawona

Wawona is located approximately 11 miles south of Chinquapin and contains areas available for use, development, or redevelopment on NPS lands within Section 35 and/or within the boundary of the South Fork of the Merced Wild and Scenic River. Additional lands in the Wawona area are under private ownership or are designated Wilderness, and therefore are not suitable for this type of development. The NPS *General Management Plan* (1980) directs use of Wawona and identifies the interpretive theme at Wawona as history—the exploration, discovery, and use of the Yosemite National Park region in the 19th century. It also states that overnight accommodations, not including camping, should be limited to a total of 145 units. The historic

Wawona Hotel includes 104 guest rooms, leaving a total of 41 units that could be developed. Development of an environmental education campus at Wawona to accommodate only 41 students would not meet the proposed action purpose and need.

Foresta

Foresta is located off of Big Oak Flat Road approximately 5 miles south of Crane Flat and contains areas suitable for use, development, or redevelopment on NPS lands where use is directed by the NPS *General Management Plan* (1980). Additional lands in the Foresta area are under private ownership and are not suitable for this type of development. The NPS *General Management Plan* (1980), which directs use of NPS lands in Foresta, states that Foresta is a quiet area away from the road where ranching was a traditional use. Visitor- use actions called for in the NPS *General Management Plan* (1980) are limited to camping, restoration, protection of park resources, and removal of facilities associated with the Meyer Ranch. Development of an environmental education campus in Foresta would be inconsistent with the direction provided in the NPS *General Management Plan* (1980).

Park Entrances—Arch Rock, Big Oak Flat, South, and Tioga Pass Entrances

The four entrances to the park (Arch Rock, Big Oak Flat, South, and Tioga Pass Entrances) are designated as development zones in the NPS General Management Plan (1980). Arch Rock is a small developed area between Yosemite Valley and El Portal that provides facilities for minor visitor use and park operations functions. Visitor- use goals and actions for this area include retention and redesign of existing facilities. Hodgdon Meadow is the site of the Big Oak Flat Entrance Station and Mather district headquarters. This northwest entrance to the park is primarily an administrative site, but camping opportunities in a low-elevation environment are also available. Most visitors from Southern California enter the park through the South Entrance at the junction of the road to the Mariposa Grove of Giant Sequoias. Visitor- use actions specified in the NPS General Management Plan (1980) for this area include redevelopment of the entrance station, road repairs, development of an information kiosk, and development of parking and staging areas. The park entrance at Tioga Pass is highlighted by expansive views of the alpine ecosystem at the crest of the Sierra Nevada. Access into the park west of the pass is closed from November to May. The NPS General Management Plan (1980) calls for the retention of the entrance station, comfort station, and ranger residence. Development of an environmental education campus at any of the four entrances to the park would be inconsistent with the direction provided in the NPS General Management Plan (1980).

Hazel Green

The NPS *Yosemite Valley Plan* (2000b) called for this location as the preferred location on Highway 120 for an approximately 720- space day- visitor parking area and support facilities. Development of an environmental education facility at Hazel Green would be incompatible with proposed visitor use facilities and would not meet the project purpose and need. This alternative would also situate facilities outside the park and would not provide an in- park overnight experience that enables the Yosemite Institute to assist the National Park Service to carry out their mission to provide programs that expose students to Yosemite National Park. All infrastructure on the site would need to be developed, which would be prohibitively expensive.

Hodgon Meadow Woodyard

Development of an environmental education facility in this location would be inconsistent with the goals of the NPS *General Management Plan* (1980) for this area and more recently the *Hodgdon Meadow Trailer Replacement and Utilities Improvement Project Environmental Assessment and Finding of No Significant Impact*

(NPS 2007c). In addition to the entrance and information function, the NPS *General Management Plan* (1980) calls for expansion of the current campground and additional housing units in the NPS residential area. Development of an environmental education facility would also be incompatible with the large public campground and NPS residential area nearby. Last, this site (as well as others, such as Hazel Green) is too far from the many educational destinations in the program and would require significant travel by bus.

Wawona North (Administrative Zone)

The Wawona North site was subject to the interim limits set for area capacity established by the NPS *Revised Merced Wild and Scenic River Comprehensive Management Plan* (2005a). The park agreed to monitor the effectiveness of the interim limits for the next three to five years, during which time no changes could be made and the possibility existed that the interim limits might not be raised. Therefore, there was a high degree of uncertainty in the feasibility of this site.

A 1981 U.S. Army Corps of Engineers floodplain analysis revealed that a portion of the site lies within the 100- year floodplain, and a substantial portion of the remainder of the site is in the 500- year floodplain of the South Fork of the Merced River. This site was considered unsuitable for construction of a school or overnight accommodations within a 100 year floodplain.

Development of an environmental education campus at the Wawona site was dismissed because it does not meet the purpose and need for the proposed action in providing a distinct, safe, and secure campus. The developed area of Wawona would offer multiple undesirable distractions for students, including easy access to the nearby general store, residences, NPS maintenance yard, heavy general use along the river banks, and a major hotel complex.

Ransom Ranch

The Ransom Ranch site on private land was considered. It would require construction of a road from private land through NPS land as a second means of fire egress. This would conflict with park policy to not allow private parties to construct new access roads across park land in the same vicinity. The buildable area of this site is approximately 6 to 8 acres spread across steep terrain. This makes designing for accessibility difficult and limits options for building and placement of circulation while minimizing impacts on resources. Ransom Ranch was initially considered because of a suggestion by the owner to use this private, outside- of- park land.

Remove the Environmental Education Campus from the Park

The removal of the environmental education campus from Yosemite National Park as an option was considered at several locations, as discussed above, but was ultimately dismissed for a variety of reasons. This option was recommended as a means to reduce development in the park. The environmental education campus is considered a visitor facility at Yosemite National Park that provides overnight accommodations and interpretation services. This partnership program aids the park in reaching thousands of young people each year, providing an intimate connection to Yosemite and the National Parks. The National Park Service is committed to allowing access and enjoyment of the park for a diverse public, by providing a range of visitor interpretation and education services and overnight facilities. As such, relocation of the environmental education campus outside of the park would be inappropriate and would not meet the proposed action purpose and need.

CAMPUS DESIGN ALTERNATIVES

Initial designs for a new campus were drawn as early as 2000, but following the scoping process in 2002 and initial work on an Administrative Draft EIS revised design alternatives for Crane Flat were dropped. New designs were developed beginning in 2007. A workshop that included the primary architects for the proposed new campus and NPS staff was held on March 18 and 19, 2008, to analyze various design scenarios and to try to produce an optimum design for each campus site. With input from resource staff, four designs were considered for each site location; after much deliberation and discussion, an optimum design was chosen for both Crane Flat and Henness Ridge. These designs were further refined, and the results are those previously presented in the Alternatives 2 and 3 descriptions. Other designs or design elements were dismissed for a variety of reasons.

COMPARISON OF ALTERNATIVES

A summary comparison of the three alternatives is presented in Table 2- 7.

Financial Feasibility/Cost Comparison

Several scenarios for the Crane Flat and Henness Ridge sites were investigated in terms of financial feasibility. The analysis was based on a financial model that allowed for testing of a range of variables and their impact on the financial implications of the scenarios. The model was based on historic financial data and project revenue, expenses, and program growth through 2017.

The economic feasibility of any given scenario is strongly tied to the ratio of on- campus beds at either Crane Flat or Henness Ridge versus those in Curry Village (which are contracted through the park's concessionaire, DNC) or other commercial lodging. The Yosemite Institute currently directly manages 76 beds year- round at Crane Flat. The ratio of DNC versus YI beds under the current scenario is 4.47 to 1. If 154 beds were to be constructed at a redeveloped Crane Flat facility, the ratio would be 1.73 to 1. If the proposed 224 beds were to be constructed at Henness Ridge, the ratio of DNC versus YI beds would be 1.18 to 1. Because it is very expensive to house students at commercial lodging, the smaller the ratio the stronger the economic feasibility of any given scenario. Though redevelopment of the Crane Flat site is feasible, the Henness Ridge campus is the most economically feasible of the three alternatives in terms of cost per student. Given the recent rockfall in Curry Village, the Yosemite Institute was lodged outside the park for a short term while DNC relocated employee bed spaces displaced by the conversion of Boystown to provide student accommodations. If the Yosemite Institute were forced to obtain lodging from commercial sources outside Yosemite National Park for the long term, the costs would not be economically sustainable by the Yosemite Institute and would likely result a cancellation of the entire environmental education program.

If the Henness Ridge site were to be ultimately chosen, this would directly benefit the Yosemite Institute's scholarship program and diversity goals of reaching low- income and underserved youth in the region. More money would be available for scholarships; a 10% to 20% increase in scholarship funding is a possibility.

PROCESS OF SELECTING THE NPS- PREFERRED ALTERNATIVE

A CBA Workshop to select an NPS- preferred alternative was held on September 17, 2008. Additional items pertaining to the purpose and need, and cultural and natural resource impacts were analyzed and documented in a matrix to help determine the preferred alternative. These are presented in Table 2- 8.

The three alternatives were ranked by assigning each item a numerical value and assessing its relative advantage. Participants shared their professional expertise regarding the potential beneficial or adverse effects of each aspect of the alternatives. Alternative 3, Henness Ridge, scored the highest, and the National Park Service confirmed this as the preferred alternative.

NPS staff presented the outcome and their recommendation to the Yosemite National Park management team. The management team requested some additional information on mitigation measures integral to the Henness Ridge alternative, and directed staff to follow up by meeting to resolve details. The management team agreed upon Alternative 3, Henness Ridge Campus, as the NPS- preferred alternative. Follow- up meetings were held by staff to select the best option for a water system for Henness Ridge, and to work out details of mitigations and restoration at Crane Flat.

Table 2-7. Alternative Comparison

Program Element	**Alternative 1:** No Action			**Alternative 2:** Crane Flat Redevelopment			**Alternative 3:** Henness Ridge Center (Preferred Alternative)		
	Quantity	**Gross Square Footage**	**Capacity**	**Quantity**	**Gross Square Footage**	**Capacity**	**Quantity**	**Gross Square Footage**	**Capacity**
Standard cabins/ dormitory	2	2,278	76 beds	4.5	10,125 total	126 beds	8	11,904	224 beds
Cabins with baths	0	N/A	N/A	1	2,500	28 beds	0	0	N/A
One-bedroom apt (staff)	0	N/A	N/A	1	630	1 bed	1	630	1 bed
Studio apts (staff)	0	N/A	N/A	2	960 total	2 beds	3	1,508	3 beds
Bunkhouse/ dormitory (staff)	3	1,188	8 beds	1 (existing)	950	11 beds	1	1,476	16 beds
Total Living Space		3,466	76 students /8 staff		15,165	154 students/14 staff		15,518	224 students/16 instructors/4 onsite staff
Arrival shelter	0	N/A	N/A	1	400	48 participants	1	475	48 participants
Dining hall/ Kitchen/	1	1,321	49 persons	1	6,950	112 @ dining room 20 @ dining annex	1	6,900	112 @ dining room 20 @ dining annex
Gear storage/ distribution	1	1,663	N/A	1	2,100	N/A	1	1,764 (under dining hall building)	N/A
Bathhouse(s)	2	916	4 sinks, 5 toilets, 4	2	3,560 total	68 each; 136 total	2	4,086	112 each; 224 total

Table 2-7. Alternative Comparison

Program Element	**Alternative 1:** No Action			**Alternative 2:** Crane Flat Redevelopment			**Alternative 3:** Henness Ridge Center (Preferred Alternative)		
	Quantity	**Gross Square Footage**	**Capacity**	**Quantity**	**Gross Square Footage**	**Capacity**	**Quantity**	**Gross Square Footage**	**Capacity**
			showers; 1 toilet						
Classrooms with labs	0	N/A	N/A	3	4,050 total	45 participants	1	3,582	60 participants
Teacher prep space	0	N/A	N/A	1	650	16 teachers	1	383	16 teachers
Site office	1	380	N/A	1	650	4 staff	1	608	4 staff
Maintenance/ Utilities	0	N/A	N/A	1	1,050	N/A	1	1,080	N/A
NPS administration/ fire house	0	N/A	Offsite	0	N/A	Offsite	1	2,592	N/A
Outdoor amphitheatre	0	N/A	N/A	1	N/A	168	1	2,000	244
Solar array (ground-mounted)	0	N/A	N/A	0	N/A	N/A	1	12,470	N/A
Total Non-Living Space	–	4,280	–	–	19,410	–	–	21,470	–
Parking Lots	–	–	20 vehicle spaces	–	–	30 vehicle spaces	–	–	39 vehicle spaces

Table 2-8. Alternative Comparison

Category	**Alternative 1:** No Action	**Alternative 2:** Crane Flat Redevelopment	**Alternative 3:** Henness Ridge Center (Preferred Alternative)
Providing for Visitor Enjoyment – Provide Visitor Services, Educational and Recreational			
Maximum student capacity at out-of-Valley locations (Crane Flat or Henness Ridge)	76 students 8 staff (5 to 6 instructors)	154 students 14 staff (11 instructors)	224 students 20 staff (16 instructors)
Average maximum student capacity at Curry Village (Boystown)	340 students (historic average maximum); approximately 237 currently at Boystown	266 students	266 students
Average maximum program capacity	416 students	420 students	490 students
Fulfills education and interpretation aspects of NPS and YI missions	Well	Very well	Very well
Enhances/increase scientific educational opportunities	No, because there is no lab or library	Yes	Yes
Promotes student diversity	Well	Very well	Exceedingly well
Provides optimal learning and teaching environment	No: the buildings are not a teaching tool, there is no classroom or lab	Yes: provides modern facilities with interpretable building design, more teaching space and laboratory	Yes: provides modern facilities with interpretable building design, more teaching space and laboratory
Allows for interpretation of cultural and archeological resources	Yes	Yes	Yes
Availability of/accessibility to high-quality stewardship projects	Good	Good	Good
Teacher education and training	Good, but the facilities are not adequate	Good	Good
Accessibility and availability of trails	Good	Good	Good
Park views	Good	Good	Very good
Compatible with surrounding uses	No	No	No
Range of quality of outdoor learning opportunities/experiences	Good	Good	Good
Providing for Visitor Enjoyment – Protect Public Health, Safety, and Welfare			
Complies with ADA guidelines	No	Yes, yet not all access would comply with ADA	Yes, all access would comply 100% with ADA

Table 2-8. Alternative Comparison

Category	**Alternative 1:** No Action	**Alternative 2:** Crane Flat Redevelopment	**Alternative 3:** Henness Ridge Center (Preferred Alternative)
		standards	standards
Complies with National Fire Protection Association code	No	Yes	Yes
Minimizes safety hazards	No	Yes	Yes
Provide safe and reliable utility systems	Somewhat, not as reliable as Alternatives 2 and 3	Yes	Yes
Provides safety and security of students and staff	Yes, yet the existing condition is below standards	Yes	Yes, and there would be a fire station onsite
Fuels	Good	Good	Good
Snow/Ice management	Relatively easy	Relatively easy	Negligibly more difficult
Emergency power	Good	Very good	Very good
Emergency access and evacuation routes	Poor	Good	Good, there is full access to all facilities, as well as a second access
Emergency response and support	Good	Good	Good , and there would be a fire station onsite
Improving Park Operations – Improve Operational Efficiency and Sustainability			
Systems reliability and efficiency	Poor	Very good	Exceedingly good
Maintenance efficiency	Poor	Very good	Exceedingly good
Operational efficiency	Poor	Very good	Exceedingly good
Snow removal	Poor accessibility	Better accessibility	Fully accessible
Consistent with NPS policy on sustainability	No	Yes	Yes
Bus transportation	6 round trips a week	9 round trips a week	15 round trips a week
Cost-Effective/Environmentally Responsible/Beneficial Projects for NPS			
Allows YNP to serve as NPS model for environmental education	No	Yes	Yes
Creates a model of sustainable building design, sensitive to natural and cultural surroundings	No	Yes	Yes , even more so than under Alternative 2
Provides close connection between YI students,	No	No	Yes, there is a fire station and NPS staff off

Table 2-8. Alternative Comparison

Category	Alternative 1: No Action	Alternative 2: Crane Flat Redevelopment	Alternative 3: Henness Ridge Center (Preferred Alternative)
programs, and staff with YNP			season on site
Does the site have adequate buildable land for a campus?	Yes	Yes	Yes, slightly more than under Alternative 2
Compatible with existing long-term park planning goals	No	No	Yes
SCORE	570	1430	2414

SUMMARY OF ENVIRONMENTAL CONSEQUENCES

Table 2- 9 summarizes the impacts that would result from implementation of each of the alternatives, including the No- Action Alternative. Table 2- 10 summarizes mitigation measures for the action alternatives. Impacts and mitigation measures summarized in these tables are described in detail in Chapter 3, Affected Environment and Environmental Consequences.

Table 2-9. Summary of Environmental Consequences by Alternative

Designation	Alternative 1: No Action	Alternative 2: Crane Flat Redevelopment	Alternative 3: Henness Ridge Center (Preferred Alternative)
Geology, Geologic Hazards, and Soils	Continued compaction and loss of topsoil due to vehicle and pedestrian use	Construction-related grading, leveling, and minor excavation, with long-term compaction of soil and possibly topsoil erosion due to vehicle and pedestrian use	Henness Ridge Impacts: Construction-related grading, leveling, and minor excavation, with long-term compaction of soil and possibly topsoil erosion due to vehicle and pedestrian use Crane Flat Impacts: Demolition-related trenching and some removal of topsoil, with long-term decompaction of soils and stabilization through revegetation
Hydrology	Continued groundwater pumping	Increase in impervious surfaces, increase in groundwater pumping, and water table decline	Henness Ridge Impacts: Increase in impervious surfaces but no measurable impact on the water table from groundwater pumping

Table 2-9. Summary of Environmental Consequences by Alternative

Designation	**Alternative 1:** No Action	**Alternative 2:** Crane Flat Redevelopment	**Alternative 3:** Henness Ridge Center (Preferred Alternative)
			Crane Flat Impacts: Removal of impervious surfaces and the cessation of campus-related groundwater pumping, which may lead to a rise in the water table
Water Quality	Some discharging of pollutants into surface and ground waters from human activities and the septic system	Construction-related stormwater runoff laden with sediment or pollutants from eroded soil, waste, or hazardous materials, an increase in impervious surfaces, and an increase in wastewater generation	Henness Ridge Impacts: Construction-related stormwater runoff laden with sediment or pollutants from eroded soil, waste, or hazardous materials, an increase in the amount of impervious surfaces, and new wastewater generation Crane Flat Impacts: Removal of most impervious surfaces and cessation of campus-related wastewater generation
Wetlands	Disturbances from student activities and continued water table decline due to groundwater pumping	Construction-related pollutant-laden stormwater runoff into Crane Flat Meadow; long-term disturbances from student activities, and water table decline from increased groundwater pumping	Henness Ridge Impacts: Construction-related pollutant-laden stormwater runoff carried downslope to Elevenmile Meadow and long-term disturbances to this meadow from student activities Crane Flat Impacts: Discontinuation of student activities and thus disturbance, removal of most impervious surfaces, and a cessation of campus-related groundwater pumping, allowing the water table to rebound

Table 2-9. Summary of Environmental Consequences by Alternative

Designation	**Alternative 1:** No Action	**Alternative 2:** Crane Flat Redevelopment	**Alternative 3:** Henness Ridge Center (Preferred Alternative)
Vegetation	Trampling, soil compaction and erosion, collection, and other use-associated impacts	Trampling, soil compaction and erosion, dust, root damage, collection, and possible introduction of non-native species	Henness Ridge Impacts: Vegetation removal, soil compaction, dust, root damage, erosion, collection, possible introduction of non-native species, and trampling Crane Flat Impacts: Cessation of student disturbance of vegetation and the revegetation of most of the campus with appropriate native plant species
Wildlife	Noise, artificial light, human presence, possible handling, automobile traffic, and other use-associated effects	Construction-related noise and ground vibrations, noise from campus activities, artificial light, human presence, handling, automobile traffic, and other use-associated effects	Henness Ridge Impacts: Construction-related removal/loss of vegetation and trees, grading, noise and ground vibrations, noise from campus activities, artificial light, human presence, handling, automobile traffic, and the creation of new trails Crane Flat Impacts: Restoring and enhancing habitat for wildlife species, restoring native vegetation and hydrologic function, and revegetating social trails
Rare, Threatened, and Endangered Species	Continued disturbance and habitat degradation	Construction-related noise and light pollution, disturbance, and loss of habitat and long-term habitat degradation and disturbance	Henness Ridge Impacts: None Crane Flat Impacts: Restoring and enhancing habitat for special-status wildlife species.
Night Sky	A continued slight glow from campus operations	A slight glow from campus operations	Henness Ridge Impacts: A slight glow from campus operations

Table 2-9. Summary of Environmental Consequences by Alternative

Designation	**Alternative 1:** No Action	**Alternative 2:** Crane Flat Redevelopment	**Alternative 3:** Henness Ridge Center (Preferred Alternative)
			Crane Flat Impacts: A removal of all artificial lighting at the campus site
Scenic Resources	Some contrast from existing campus facilities	Temporary contrast from construction equipment, demolished buildings, and exposed soil, and permanent contrasts from new buildings and campus operations	Henness Ridge Impacts: Temporary contrast from construction activities, and permanent contrasts from new buildings and campus operations Crane Flat Impacts: Temporary contrast from construction equipment, demolished buildings, and exposed soil and no contrast when all structures and infrastructure are removed from the campus site
Air Quality	Wood-burning stoves and vehicle admissions from users traveling to and from the campus	Temporary construction-related engine and dust emissions and increased vehicle emissions from more users traveling to and from the campus	Henness Ridge Impacts: Temporary construction-related engine and dust emissions and increased vehicle emissions from more users traveling to and from the campus. Crane Flat Impacts: Removal of all wood burning stoves and the elimination of all campus-related vehicle emissions
Soundscape	Human voices, noise associated with education activities, and vehicle noise as people enter and exit the campus	Noise from construction equipment, noise associated construction-related traffic, human voices, noise associated with educational activities and student play, and vehicle noise as people enter and exit the campus	Henness Ridge Impacts: Noise from construction equipment, noise associated construction-related traffic, human voices, noise associated with educational activities and student play, and vehicle noise as people enter and exit the campus Crane Flat Impacts: Removal of all campus-related activities, human

Table 2-9. Summary of Environmental Consequences by Alternative

Designation	**Alternative 1:** No Action	**Alternative 2:** Crane Flat Redevelopment	**Alternative 3:** Henness Ridge Center (Preferred Alternative)
			voices, and vehicle noise and a return to the natural soundscape
Energy	Continued use of wood-burning stoves as the primary heat source, heating poorly insulated facilities, and facilities requiring additional attention over time	Construction-related energy consumption of fuel, materials, and electricity, and increased energy consumption, however the energy-efficient facilities would decrease per capita energy consumption at the campus	Henness Ridge Impacts: Construction-related energy consumption of fuel, materials, and electricity, and increased energy consumption, however the energy-efficient facilities would decrease per capita energy consumption that may approach "net zero" Crane Flat Impacts: Removal of all campus-related energy-consuming infrastructure
Wilderness	Continued use of Wilderness for campus activities such as hiking, snowshoeing, or skiing	Increased use of Wilderness for campus activities such as hiking, snowshoeing, or skiing	Henness Ridge Impacts: Increased campus activities such as hiking, snowshoeing, or skiing in nearby designated Wilderness. Removal of impediments to a 64-acre Wilderness addition along Indian Creek. Crane Flat Impacts: Cessation of all campus activities in the Wilderness
Archeology	No construction-related impacts would occur; continued operation of the existing campus would result in no effect on historic properties	Construction-related activities and operation-related activities would result in no effect on historic properties and no significant impact to cultural resource components of the Crane Flat campus site that are not considered historic properties. In the unlikely event that undocumented archeological resources or human burials are exposed	Henness Ridge Impacts: Construction of the Henness Ridge Center will have no adverse effect on archeological resources CA-MRP-1485H a segment of the Old Wawona Road (P-22-000296), and a segment of Old Glacier Point Road (CA-MRP-1525H). Crane Flat Impacts: Restoration of the Crane

Table 2-9. Summary of Environmental Consequences by Alternative

Designation	**Alternative 1:** No Action	**Alternative 2:** Crane Flat Redevelopment	**Alternative 3:** Henness Ridge Center (Preferred Alternative)
		during construction activities, the discovery procedures outlined in Stipulation X of the 1999 PA will be implemented.	Flat campus would result in no effect to archeological historic properties
American Indian Traditional Cultural Properties	No construction or operation related impacts would occur	No adverse effects to resources managed as American Indian Traditional Cultural Properties	Henness Ridge Impacts: Construction- no historic properties present Crane Flat Impacts: Restoration of the Crane Flat campus would result in no adverse effect to resources managed as American Indian Traditional Cultural Properties
Historic Structures, Buildings, and Cultural Landscapes	No construction-related impacts would occur. Operation-related impacts would have no adverses effect by visitor use or routine maintenance and repair of historic structures, buildings, and cultural landscapes. Campus operations would have no adverse effect on four historic properties.	Redevelopment of the Crane Flat campus would have an adverse effect on two historic properties (Buildings 6014 and 6015); operation of the campus would have no adverse effect on the two historic properties remaining (Buildings 6013 and 6017) after removal of Buildings 6014 and 6015	Henness Ridge Impacts: There would be no effect to historic properties at the proposed Henness Ridge Center location There would be no adverse effect to historic structures or cultural landscape associated with the Chinquapin Historic District / Developed Area Cultural Landscape Crane Flat Impacts: Restoration of the existing Crane Flat campus would result in an adverse effect to three historic properties (Buildings 6013, 6014, and 6015), and a no adverse effect to historic property Building 6017. Adverse effect would be resolved following Stipulation VIII B of the 1999 PA.

Table 2-9. Summary of Environmental Consequences by Alternative

Designation	**Alternative 1:** No Action	**Alternative 2:** Crane Flat Redevelopment	**Alternative 3:** Henness Ridge Center (Preferred Alternative)
American Indian Traditional Cultural Practices	No construction or operation related impacts would occur	No impact to American Indian traditional cultural practices in the Crane Flat and Meadow area	Henness Ridge Impacts: Construction- and operation-related impacts would have a negligible impact to traditional cultural practices Crane Flat Impacts: Restoration of the Crane Flat campus would result in a beneficial impact to traditional cultural practices
Visitor Experience and Recreation	Continued limitation of student enrollment size, deteriorating facilities with noncompliant features, and crowding	Temporary suspension of recreational opportunities at the campus, increased number of students able to stay on campus, decreased use of offsite facilities, improved functionality of the campus, and reduced crowding	Henness Ridge Impacts: Temporary suspension of recreational opportunities at the campus, increased number of students able to stay on campus, decreased use of offsite facilities, improved educational activities, and reduced crowding Crane Flat Impacts: Improved scenic views along Tioga Road, enhanced wilderness characteristics of designated trail corridors in the area, and decreased use of informal trails between Tuolumne Grove and Crane Flat
Park Facilities and Operation	Disproportionate demands on park operation for repair and maintenance work and safety	Increased demands on facilities management staff to address traffic concerns during construction, increased campus-generated visitation to the park, decreased maintenance and repair work demands on facilities management staff, and increased fire protection for the campus	Henness Ridge Impacts: Increased demands on facilities management staff to address traffic concerns during construction, increased campus-generated visitation to the park, decreased maintenance and repair work demands on facilities management staff, and increased fire protection for the campus

Table 2-9. Summary of Environmental Consequences by Alternative

Designation	**Alternative 1:** No Action	**Alternative 2:** Crane Flat Redevelopment	**Alternative 3:** Henness Ridge Center (Preferred Alternative)
			Crane Flat Impacts: Increased demands on the facilities management staff to address safety and traffic concerns during demolition and restoration but thereafter no demand on park operations
Transportation	Continued contribution of campus-related traffic on local roadways	Construction-related traffic for personnel, equipment, and materials, and increased campus users traveling to and from the site	Henness Ridge Impacts: Construction-related traffic for personnel, equipment, and materials, and increased traffic on local roads from campus users traveling to and from the site Crane Flat Impacts: Demolition and restoration-related traffic, with permanent elimination of all campus-generated traffic on roads in the Crane Flat area
Land Use	No impact.	No impact.	Henness Ridge Impacts: Redesignation of land use to the natural zone (Wilderness subzone) after 64 acres becomes eligible for Wilderness along Indian Creek. Inconsistency with the goals and actions stated in the Glacier Point Road Development Concept. Crane Flat Impacts: Redesignation of land use to the natural zone.
Community Values	Continued staff residence in the communities of El Portal, Foresta, and Yosemite West	Increased staff residence in the communities of El Portal, Foresta, and Yosemite West	Henness Ridge Impacts: Increased demand for housing, services, and amenities in Yosemite West and Wawona

Table 2-9. Summary of Environmental Consequences by Alternative

Designation	Alternative 1: No Action	Alternative 2: Crane Flat Redevelopment	Alternative 3: Henness Ridge Center (Preferred Alternative)
			Crane Flat Impacts: Decreased demand for housing, services, and amenities in Foresta and El Portal
Socioeconomics	Employment, regional and local spending, and effects on local and regional housing demand	Increased construction-related employment, regional and local spending, and a slight increase in housing demand	Henness Ridge Impacts: Increased construction-related employment, regional and local spending, and a shift in housing demand from the El Portal area to the Yosemite West area Crane Flat Impacts: Temporary construction-related employment, with a long-term decrease in employment, local spending, and the housing demand in the El Portal area

Table 2-10. Mitigation Measures for the Action Alternatives

Resource	Mitigation Measures for the Action Alternatives to Minimize or Prevent or Resolve Adverse Impacts to Park Resources	Alt. 2 Redevelop Crane Flat	Alt. 3 Henness Ridge Center (restore CF)
Geology, Geologic Hazards, and Soils	See Appendix C for standard Best Management Practices.	X	X
Hydrology and Wetlands	The park will regularly monitor Crane Flat well water levels and use models to set specific volume and schedule for withdrawal to aid in water table recovery, to retain necessary moisture levels in the fen.	X	X
	The park and YI will halt well-pumping during severe dry periods, and instead, haul domestic water from offsite.	X	
	The park will continue to monitor water levels at Indian Creek well (non-surface water aquifer) and continue to coordinate with county and local well providers to ensure	X	X

Table 2-10. Mitigation Measures for the Action Alternatives

Resource	Mitigation Measures for the Action Alternatives to Minimize or Prevent or Resolve Adverse Impacts to Park Resources	Alt. 2 Redevelop Crane Flat	Alt. 3 Henness Ridge Center (restore CF)
	consistent supply, and will implement water conservation measures and adjust pumping accordingly to protect resources.		
	The design contractor will incorporate detention structures, basins, and cisterns to capture and reapply runoff, and will include pervious walkways in the campus landscape to aid in stormwater infiltration.	X	X
	Paved roadways for emergency vehicle access will be minimal and limited to approximately 10 ft in width, with an additional 3 ft of side clearance, consisting of permeable natural material, to promote water infiltration.	X	X
Hydrology and Wetlands	Crane Flat meadow will be restored where trailers are removed, and under alternative 2, fencing would be placed at the campus boundary to deter trampling, and direct visitors toward the Wilderness trailhead.	X	X
	Under Alternative 3, in addition to trailer removal and meadow restoration, *all* of the Crane Flat campus site will be restored to natural conditions, according to the Restoration plan; soil would be loosened (avoiding disturbance to archeological features).and replanted with local seed stock.		X
	Under Alternative 3, in addition to trailer removal and meadow restoration, *all* of the Crane Flat campus site would be restored to natural conditions, according to the Restoration plan; soil would be loosened (avoiding disturbance to archeological features) and replanted with local seed stock.	X	X
	YI will continue to provide education regarding fragile meadow ecosystems, and will not conduct teaching activities within meadows during the wet or growing seasons (from snowmelt to snowfall), and will stay on designated trails and gathering areas, to protect sensitive vegetation, soils, and wildlife habitat.	X	X
	The park will replant the Indian Creek well site with suitable native vegetation to stabilize riparian soils near Indian Creek while maintaining maintenance access to the wellhead.	X	X

Table 2-10. Mitigation Measures for the Action Alternatives

Resource	Mitigation Measures for the Action Alternatives to Minimize or Prevent or Resolve Adverse Impacts to Park Resources	Alt. 2 Redevelop Crane Flat	Alt. 3 Henness Ridge Center (restore CF)
Water Quality	Also see Appendix C for standard Best Management Practices.	X	X
	Design contractors will integrate water conservation and water quality protection measures into the campus design.	X	X
	Water quality will continue to be monitored by park technicians to ensure public health and safety standards are maintained.	X	X
	Indian Creek well water treatment facility at Chinquapin will treat water to provide potable water for visitors to the Chinquapin Comfort Station, for the Ranger residence, and potential campus at Henness Ridge.	X	X
	Water treatment will meet all county and state health and safety standards, and campus overnight capacity will not exceed that permissible under county water system requirements.	X	X
	Indian Creek well water treatment facility will be housed at Chinquapin, within the bays of the historic garage behind the Ranger residence, and will be designed in consultation with the park historic architect to avoid impacts to the structure's historic integrity or the cultural landscape. Nearby historic water tank will be stabilized but not removed or otherwise disturbed.	X	X
	Remove siphon/diversion of surface water from Indian Creek.	X	X
Vegetation	Also see Appendix C for standard Best Management Practices, and Yosemite National Park Invasive Plant Management Plan measures to prevent introduction or spread of invasive species during construction and operations.	X	X
	Vegetation salvage, seed collection, and revegetation shall be implemented by the park as defined in the Revegetation Plan.	X	X
	The landscape design contractors will consult with park botanists to ensure local stock and appropriate native species are used in the landscaping plan. The park will develop and implement a monitoring plan to ensure	X	X

Table 2-10. Mitigation Measures for the Action Alternatives

Resource	Mitigation Measures for the Action Alternatives to Minimize or Prevent or Resolve Adverse Impacts to Park Resources	Alt. 2 Redevelop Crane Flat	Alt. 3 Henness Ridge Center (restore CF)
	successful revegetation, maintain plantings, and replace unsuccessful plant materials.		
	The park will monitor and remove invasive species at the project area(s) for a period of four years post construction in accordance with the Invasive Plant Management Plan, and Restoration and Revegetation plan.	X	X
	The design contractor will work closely with the park forester and biologists to minimize tree removal in campus design and as part of construction, and limit tree removal after construction, to hazard trees (see also R, T, and E mitigation measures).	X	X
Wildlife Wildlife	The park biologists will establish 500-foot buffer zones of no-activity around any active nest sites found in or around the campus during the breeding season, to avoid disruption.	X	X
	Large diameter logs, snags, and boulders will be retained onsite to maintain habitat for sensitive species and their prey.	X	X
	Prior to tree removal for construction, the park biologists will identify and flag valuable wildlife trees (especially snags) on and around campus, to retain as many of these trees as possible. Where large diameter trees are identified as safety hazards, the forester will work closely with the biologists, on a case-by case basis, to determine whether the tree can be modified and retained as a shorter, less hazardous tree for wildlife.	X	X
	Park biologists will identify and notify YI staff and students, and park personnel to avoid any active nests or dens, and to employ quiet observation and travel near meadows and riparian areas.	X	X
	A "Minimum Disturbance Protocol" applies for activities near meadows. Park biologists will work with YI to identify and establish appropriate areas for quiet meadow-side observations:	X	X
	▪ Noise will be restricted within 200 feet of meadows and riparian areas	X	X
	▪ Visits by students and staff will be restricted to outside meadows; no activities will take place in	X	X

Table 2-10. Mitigation Measures for the Action Alternatives

Resource	Mitigation Measures for the Action Alternatives to Minimize or Prevent or Resolve Adverse Impacts to Park Resources	Alt. 2 Redevelop Crane Flat	Alt. 3 Henness Ridge Center (restore CF)
	the meadows themselves, other than NPS-directed restoration and monitoring.		
	▪ Resource specialists and YI will monitor for any new trail development (especially within or circling the meadows), and may close such areas for restoration as necessary.	X	X
	▪ YI groups and staff will follow guidelines for owl protection, including limiting meadow visits to three 30-minute time blocks per day, or one 1-hour time block per day.	X	X
	▪ Meadow visitation times are restricted to daylight hours, (between 30 minutes after dawn, and 30 minutes before dusk) to avoid disturbing foraging owls and other wildlife.	X	X
	YI programs will include education on staying on established trails to prevent erosion, and protecting campus areas from becoming trampled and denuded by gathering only in established areas, rotating activity locations. (Fire and other park and YI staff that are lodging or training on site will adhere to the same guidelines.)	X	X
Rare, Threatened, and Endangered (R, T, & E) Species Rare, Threatened, and Endangered Species	Park biologists, foresters, and fire managers will work closely together to maintain fire and human safety in the wildland urban interface, while retaining cover for R, T, & E species, by limbing trees to no higher than 6 feet, (excluding hazard removal of large dead limbs), maintaining large diameter woody debris, and retaining low levels of natural accumulations of forest litter and duff on campus, to provide cover for Pacific fisher, its prey, and for native plant regeneration.	X	X
	Surveys will be conducted by park biologists in the spring (beginning March 15) to establish whether owls or other sensitive species are nesting and foraging in the vicinity of the project. If owls are present, construction project manager will work with biologist to determine appropriate measures to avoid disturbance, such as no construction activities between 30 minutes before dusk and after dawn, and a 500 ft buffer of no disturbance (light or noise) around nest trees from March 15 through August 31.	X	X
	Park biologists will continue to work closely with fisher researchers working in and around the park to establish	X	X

Table 2-10. Mitigation Measures for the Action Alternatives

Resource	Mitigation Measures for the Action Alternatives to Minimize or Prevent or Resolve Adverse Impacts to Park Resources	Alt. 2 Redevelop Crane Flat	Alt. 3 Henness Ridge Center (restore CF)
	whether fishers are actively foraging or denning near the project area, and may set additional protection measures as deemed necessary, to avoid disturbance during construction.		
	Prior to construction, park resource specialists will install fencing around, or clearly flag and mark populations of rare plants for avoidance, including Yosemite rock cress, Bolander's dandelion, and Fresno mat. Rare plants within the construction footprint will be salvaged, maintained, and reused in campus site restoration and landscaping. Additional Fresno mat plants will be propagated from local native stock to be used for landscaping and erosion control.	X	X
	Park resource specialists may restore or enhance habitat elements surrounding the campus through plantings, log placement, snag creation, or by restricting access in specific zones, to offset minor effects of habitat displacement and to maintain wildlife cover and travel corridors.	X	X
	The park and YI will ensure that campus activities that might trample vegetation, such as picnicking, will not take place in the vicinity of sensitive rare plant populations, especially Bolander's dandelion population.	X	X
	Park resource specialists will work with YI to identify opportunities for students to participate in meadow restoration, monitoring, and invasive plant removal.	X	X
	Prior to construction, park biologists will survey the campus area and designate a 500-foot buffer around essential habitat elements (e.g., downed logs, hollow trees, etc.) or sign of Pacific fisher, and may conduct more intensive surveys if appropriate to determine the presence or absence of active dens.	X	X
	The park forester, fire management, and design contractor will consult with the park biologists to retain key habitat features for Pacific fisher including overhead cover, large diameter snags, large diameter down logs, large diameter live conifer and oak trees with decadence such as broken tops or cavities, root masses, live branches, and multi-layered vegetation.	X	X

Table 2-10. Mitigation Measures for the Action Alternatives

Resource	Mitigation Measures for the Action Alternatives to Minimize or Prevent or Resolve Adverse Impacts to Park Resources	Alt. 2 Redevelop Crane Flat	Alt. 3 Henness Ridge Center (restore CF)
	Vehicle access to Eleven-mile meadow will be restricted to park administrative use only, by installation of a gate near the Old Wawona road junction and the campus amphitheatre.		X
	The park and YI will prohibit students and staff from proceeding beyond Rail Creek drainage (Alternative 3). During the breeding season (1 April to 1 September), (1) visits to Rail Creek will be restricted to one 30-minute time period per day; (2) activity will not occur in the creek downstream of 11-Mile Road and will not proceed farther down the road past the creek; (3) noise and vigorous activity will be minimized; and (4) no visits to Rail Creek between dusk and dawn will occur.		X
	For any construction or demolition activities that occur between March 15 and July 15, surveys shall be conducted by park resource staff in the spring (beginning on March 15) to determine if owls are in the vicinity of the project. If owls are present, construction will be delayed until surveys confirm that owls are not breeding (March 15 through July 15). If owls are nesting within ¼ mile of the project area, the impact of the proposed project and site should be assessed in relation to the proximity to the nest site. Park resource staff will determine if construction activities may continue or will be delayed until after nestlings have fledged (September 1).		X
	For any construction or demolition activities that occur between May 1 and August 31, surveys shall be conducted by park resource staff in the late spring (beginning on May 1) to determine if willow flycatchers are present. If willow flycatchers are present, construction will be delayed until surveys confirm that the birds are not breeding (May 1 through August 31). If willow flycatchers are nesting within the meadow, the impact of the proposed project and site should be assessed in relation to the proximity to the nest site. If it is determined that willow flycatcher are nesting within the vicinity of the project, no construction activities shall occur before 11 a.m. during nesting season (May 1 through August 31).	X	X
Night Sky	Campus lighting will be minimal, low intensity, low in	X	X

Table 2-10. Mitigation Measures for the Action Alternatives

Resource	Mitigation Measures for the Action Alternatives to Minimize or Prevent or Resolve Adverse Impacts to Park Resources	Alt. 2 Redevelop Crane Flat	Alt. 3 Henness Ridge Center (restore CF)
	height, and illuminate downward, in the intended area; shielded so that the light is not directed skyward.		
	The design contractor will ensure that lighting will be of minimal brilliance to illuminate the intended area, and meet the intended purpose at that specific location (i.e., residences, parking lots, signs, walkways) for work, safety, and instruction.	X	X
	The design contractor will ensure that lighting minimizes the potential for light pollution (yellow scatters less than white in the atmosphere).	X	X
	The design contractor will ensure that existing fixtures are retrofitted with light-shielding and lamps that serve only the intended purpose and minimize the potential for light pollution.	X	X
Scenic Resources	The design contractor will work with the existing topography to minimize campus visibility, and impacts to cultural and scenic landscapes.	X	X
	The landscape design contractor will reduce line contrasts by "feathering" vegetation and exposed soil boundaries with rocks, boulders, vegetation litter, tree limbs, etc.	X	X
	Landscape design will include plantings with native vegetation to screen the campus from visitors passing along the roadway.	X	X
	The landscape design contractor will follow park Design Guidelines, and work with park resource staff to ensure the use of appropriate building colors and materials to minimize building profiles and to disguise facilities and equipment to blend with the surrounding landscape.	X	X
	The Indian Creek wellhead will be dropped to ground level or otherwise shielded from visitors' view. The park will restore the riparian zone by replanting with low-level plantings of native plants that disguise (and deter visitor parking) but maintain access to the site, and continue to monitor the site for invasive plants.	X	X
Air Quality	Solar power will be generated on site to reduce reliance upon traditional power sources.		X

Table 2-10. Mitigation Measures for the Action Alternatives

Resource	Mitigation Measures for the Action Alternatives to Minimize or Prevent or Resolve Adverse Impacts to Park Resources	Alt. 2 Redevelop Crane Flat	Alt. 3 Henness Ridge Center (restore CF)
Soundscape	The generator supplying power to the campus will be insulated to reduce noise pollution and reduce impacts to sensitive wildlife.	X	X
	Under Alternative 3, a generator will be run only occasionally, as emergency back-up power.	X	X
	YI will continue to implement quiet hours on campus, and educate students regarding effects of noise on wildlife and soundscapes.		X
Energy	Heating systems will be energy efficient and meet or exceed environmental protection standards.		X
	A new energy-efficient generator will be installed on campus, which would only be run as emergency back-up, for a minimal time as necessary.		X
Wilderness	Remove impediments to allow for 64 acre Wilderness addition at Indian Creek (CA Wilderness Act, 1984, Sec. 106, 108): Remove modern water storage and treatment building (partially constructed) near historic cedar tank (retain). Restore building site with native vegetation. Manage historic Glacier Point Road (Indian Creek route to Badger Pass) as Wilderness trail; close to vehicle traffic.		X
	YI will continue to maintain appropriate group sizes (Wilderness group sizes are limited to 15 or less); YI will continue to limit number of groups per day, and rotate areas of use, in consultation with Wilderness managers.	X	X
Archeology	See also Appendix C, Best Management Practices, for additional mitigation measures to prevent harm to archeological resources.		
	For archeological resources, campus design includes avoidance of sites and maintenance of archaeological features (such as roadbeds and foundations) through project design and close consultation with the park archeologist.		X
	In the unlikely event that undocumented archeological resources or human burials are exposed during construction activities, discovery procedures shall be followed, as outlined in Stipulation X of the 1999 PA, and include activity stoppage in the vicinity of the discovery,	X	X

Table 2-10. Mitigation Measures for the Action Alternatives

Resource	Mitigation Measures for the Action Alternatives to Minimize or Prevent or Resolve Adverse Impacts to Park Resources	Alt. 2 Redevelop Crane Flat	Alt. 3 Henness Ridge Center (restore CF)
	notification and consultation regarding treatment of the discovery with the State Historic Preservation Officer (SHPO) and Indian Tribe(s) as appropriate, and treatment of Native American burials and funerary objects with respect and in accordance with federal law, including but not limited to the Native American Graves Protection and Repatriation Act (NAGPRA).		
Historic Structures, Buildings, and Cultural Landscapes	Consultation with the SHPO, American Indian tribes, and the public is effectuated in this document, for the proposed measures to resolve adverse effects as a result of removal of historic properties (Buildings 6013, 6014 under Alternative 2, and 6013, 6014, and 6015 under Alternative 3) at Crane Flat. Standard mitigation measures (SMMs) detailed in Stipulation VIII A of the 1999 PA (Appendix A) would be implemented. SMMs include recordation, salvage, interpretation, and NRHP re-evaluation. Historic American Buildings Survey (HABS)/Historic American Engineering Record (HAER) photo-documentation would be done prior to removal Historic materials would be salvaged and reused to the extent practicable.	X	X
	New buildings and structures would follow design guidelines for Yosemite National Park, and new buildings and structures at Crane Flat would also meet the Secretary of Interior's Standards and Guidelines for Historic Preservation. Designs will be developed in consultation with the park historical architect. Design measures include avoiding impacts to historic structures and cultural landscapes by incorporating or avoiding historic features, and designing structures and pathways to avoid or be compatible with surrounding historic resources, and screening new development from surrounding historic resources, according to design guidelines for Yosemite National Park.	X	X
	Adverse effect of removal of two historic properties under Alternative 2 and three under Alternative 3 would be resolved by implementing SMMs in Section VIII of the Park's 1999 PA, enumerated above, and retention and repair of Building 6017 according to the Secretary of Interior's Standards and Guidelines for Historic Preservation. The history of the Blister Rust camps and CCC camp would be interpreted for park visitors in the vicinity (at appropriate locations nearby, such as along	X	X

Table 2-10. Mitigation Measures for the Action Alternatives

Resource	Mitigation Measures for the Action Alternatives to Minimize or Prevent or Resolve Adverse Impacts to Park Resources	Alt. 2 Redevelop Crane Flat	Alt. 3 Henness Ridge Center (restore CF)
	the Tuolumne Grove trail in Crane Flat, and the Henness Ridge campus) and would include a description of the historical alteration of the human environment, and reasons for that alteration.		
	In the unlikely event that undocumented archeological resources or human burials are exposed during construction activities, the discovery procedures outlined in Stipulation X of the 1999 PA will be implemented.	X	X
	American Indian tribes shall be notified and invited to the project area during ground disturbing activities.	X	X
American Indian Traditional Cultural Properties	Ongoing consultation with American Indians with traditional cultural ties to the Crane Flat and Henness Ridge areas will continue. Appropriate strategies will be developed to avoid or mitigate any future-identified impacts on properties managed as traditional cultural properties and other American Indian traditional resources. The park will continue to consult with tribes on providing access to traditional use and spiritual areas, screening development from traditional use areas.	X	X
	American Indian tribes may also participate during construction and restoration activities to assist NPS in the protection of TCPs.	X	X
American Indian Traditional Practices	With continuing consultation, appropriate strategies would be developed to avoid impacts to traditional cultural practices and other American Indian traditional resources. Such strategies would include continuing to provide access to traditional use and spiritual areas.	X	X
	American Indian consultation and participation will continue during Crane Flat site restoration.		X
	Consultation will continue regarding the development of interpretation and educational activities, to enhance the interpretation and understanding of Yosemite National Park's American Indian cultural resources.	X	X
	Ongoing consultation with local American Indian tribes will assist and advise NPS in the continuing protection of traditional cultural practices use areas.	X	X
	Trees on the campus site(s) that are determined hazard trees, such as large diameter sugar pines or cedars of	X	X

Table 2-10. Mitigation Measures for the Action Alternatives

Resource	Mitigation Measures for the Action Alternatives to Minimize or Prevent or Resolve Adverse Impacts to Park Resources	Alt. 2 Redevelop Crane Flat	Alt. 3 Henness Ridge Center (restore CF)
	non-commercial quality that are scheduled to be removed for construction will be offered to tribes for other traditional uses.		
	Sugar pine trees with cat faces (fire scars), that are not determined hazards, will be maintained and interpreted as a traditional resource.		X
Visitor Experience and Recreation	YI programs will continue to emphasize stewardship, ethics, and other National Park values, and encourage respectful trail etiquette.	X	X
	YI will continue to provide directional signs to orient visitors to public areas, and to direct visitors and students away from closures of sensitive resource areas.	X	X
	YI will continue to maintain group sizes of 15 or less.	X	X
	YI will continue to limit the number of groups per trail, in consultation with Wilderness management.	X	X
Park Operations and Facilities	See Appendix C for standard Best Management Practices.	X	X
Transportation	Also see Appendix C for standard Best Management Practices.	X	X
	The existing transportation "level of service" in the vicinity of a new or redeveloped campus will be maintained.	X	X
	Traffic signs indicating pedestrians and traffic-calming devices will be installed along the highway near the campus, to reduce traffic speed and increase safety of park visitors and wildlife.	X	X
	Adequate turning radii and sight lines for the campus entrance will be maintained, to provide for visitor and bus safety.	X	X
Land Use Land Use	Developing a campus at Henness Ridge would preclude future development of a campground or out of Valley parking area between the campus and Yosemite West community.		X
	Impediments to Wilderness designation near Henness Ridge at Indian creek would be removed, allowing for		X

Table 2-10. Mitigation Measures for the Action Alternatives

Resource	Mitigation Measures for the Action Alternatives to Minimize or Prevent or Resolve Adverse Impacts to Park Resources	Alt. 2 Redevelop Crane Flat	Alt. 3 Henness Ridge Center (restore CF)
	that area to be managed as Wilderness, protecting it from future development and protecting valuable habitat for sensitive species along the riparian travel corridor (see Wilderness mitigations).		
	New utility lines will be located within existing road corridors.		X
Community Values	The park will continue to involve the local communities and stakeholders in Yosemite National Park planning efforts, and continue to seek their input regarding visitor services, programs, and park operations.	X	X
	The park will continue cooperative efforts to maintain and improve fire safety in the wildland-urban interface, as prescribed in the Yosemite Fire Management Plan.	X	X
Socioeconomics	The park will continue to work with gateway partner communities and stakeholders regarding tourism, visitors, park operations, and planning.	X	X

CHAPTER 3: AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter provides a description of the affected environment and an analysis of environmental consequences. The affected environment describes the existing environment and provides a baseline to assess impacts of the various alternatives. The environmental consequences describe the anticipated impacts of each alternative described in Chapter 2 and include intensity thresholds and impairment determinations.

ORGANIZATION OF THIS CHAPTER

The chapter is organized by resource topic. The existing affected environment of each resource topic and the environmental consequences of each alternative on this environment are described. Resource topics were selected for detailed environmental analysis based on their potential to be affected by the alternatives; federal law, regulations, and executive orders; National Park Service (NPS) management policies; and concerns expressed by the public, Yosemite National Park staff, or other agencies during the scoping process. Topics that were dismissed from further analysis are listed in Chapter 1.

Affected Environment

The description begins with a broader regional setting and then presents details of the immediate environment in and around Crane Flat and Henness Ridge. The current conditions described in these sections serve as a baseline to analyze and compare the potential effects of each alternative.

Environmental Consequences

Following a description of the affected environment, the potential environmental consequences, or impacts, that would occur as a result of implementing each alternative are analyzed and presented for each resource topic. Direct and indirect effects, as well as impairment to park resources, are discussed for each resource. Potential impacts are described in terms of context, duration, intensity, and type. General definitions for all resources except for historic properties subject to requirements of the National Historic Preservation Act (NHPA) are as follows; specific impact thresholds (intensity) are described at the beginning of each resource's environmental consequences section. Methodology to determine effects on historic properties are presented below.

- ***Context*** describes the area or location in which the impact would occur. Are the effects site-specific, local, regional, or even broader?
- ***Duration*** describes the length of time an effect would last, either short-term or long-term:
  - **Short-term** impacts generally last only as long as the construction period, and the resources generally resume their preconstruction conditions following construction.
  - **Long-term** impacts last beyond the construction period, and the resources may not resume their preconstruction conditions for a longer period following construction.
- ***Intensity*** describes the degree, level, or strength of an impact. For this analysis, intensity has been categorized into negligible, minor, moderate, and major. Because definitions of intensity vary by resource topic, intensity definitions are provided separately for each resource topic.
- ***Type*** describes the classification of the impact as either beneficial or adverse, direct or indirect:

- **Beneficial:** A positive change in the condition or appearance of the resource, or a change that moves the resource toward a desired condition.
- **Adverse:** A change that moves the resource away from a desired condition or detracts from its appearance or condition.
- **Direct:** An effect that is caused by an action and occurs in the same time and place.
- **Indirect:** An effect that is caused by an action but is later in time or farther removed in distance, but is still reasonably foreseeable.

Impairment

NPS *Management Policies* (2006) require analysis of potential effects to determine whether actions would impair park resources (NPS 2006). The fundamental purpose of the national park system, established by the Organic Act (16 United States Code [USC] 1) and reaffirmed by the General Authorities Act, begins with a mandate to conserve park resources and values. NPS managers must always seek ways to avoid, or minimize to the greatest degree practicable, adverse impacts on park resources and values. The laws give the National Park Service the management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, as long as the impact does not constitute impairment of the affected resources and values.

In addition to determining the environmental consequences of the alternatives, NPS *Management Policies* (2006) and Director's Order (DO) 12 requires an analysis of potential effects to determine if actions would impair park resources. As such, an impact that would harm the integrity of the park resources or values, including the opportunities that otherwise would be present for those resources or values would constitute impairment. In this environmental impact statement (EIS), determinations of impairment are provided in the conclusion section under each applicable resource topic for each alternative.

1.4.3 The NPS Obligation to Conserve and Provide for Enjoyment of Park Resources and Values

The fundamental purpose of the national park system, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. This mandate is independent of the separate prohibition on impairment and applies all the time with respect to all park resources and values, even when there is no risk that any park resources or values may be impaired. NPS managers must always seek ways to avoid, or to minimize to the greatest extent practicable, adverse impacts on park resources and values. The laws do give the Service the management discretion, however, to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a park, so long as the impact does not constitute impairment of the affected resources and values.

The fundamental purpose of all parks also includes providing for the enjoyment of park resources and values by the people of the United States. The enjoyment that is contemplated by the statute is broad; it is the enjoyment of all the people of the United States and includes enjoyment both by people who visit parks and by those who appreciate them from afar. It also includes deriving benefit (including scientific knowledge) and inspiration from parks, as well as other forms of enjoyment and inspiration. Congress, recognizing that the enjoyment by future generations of the national parks can be ensured only if the superb quality of park resources and values is left unimpaired, has provided that when there is a conflict between conserving resources and values and providing for enjoyment of them, conservation is to be predominant. This is how courts have consistently interpreted the Organic Act.

1.4.4 The Prohibition on Impairment of Park Resources and Values

While Congress has given the Service the management discretion to allow impacts within parks, that discretion is limited by the statutory requirement (generally enforceable by the federal courts) that the Park Service must leave park resources and values unimpaired unless a particular law directly and specifically provides otherwise. This, the cornerstone of the Organic Act, establishes the primary responsibility of the NPS. It ensures that park resources and values will continue to exist in a condition that will allow the American people to have present and future opportunities for enjoyment of them.

The impairment of park resources and values may not be allowed by the Service unless directly and specifically provided for by legislation or by the proclamation establishing the park. The relevant legislation or proclamation must provide explicitly (not by implication or inference) for the activity, in terms that keep the Service from having the authority to manage the activity so as to avoid the impairment.

1.4.5 What Constitutes Impairment of Park Resources and Values

The impairment that is prohibited by the Organic Act and the General Authorities Act is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values. Whether an impact meets this definition depends on the particular resources and values that would be affected; the severity, duration, and timing of the impact; the direct and indirect effects of the impact; and the cumulative effects of the impact in question and other impacts.

- An impact to any park resource or value may, but does not necessarily, constitute impairment. An impact would be more likely to constitute impairment to the extent that it affects a resource or value whose conservation is necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or
- key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or
- identified in the park's general management plan or other relevant NPS planning documents as being of significance.

An impact would be less likely to constitute impairment if it is an unavoidable result of an action necessary to preserve or restore the integrity of park resources or values and it cannot be further mitigated. An impact that may, but would not necessarily, lead to impairment may result from visitor activities; NPS administrative activities; or activities undertaken by concessionaires, contractors, and others operating in the park. Impairment may also result from sources or activities outside the park.

1.4.6 What Constitutes Park Resources and Values

The "park resources and values" that are subject to the no- impairment standard include: the park's scenery, natural and historic objects, and wildlife, and the processes and conditions that sustain them, including, to the extent present in the park: the ecological, biological, and physical processes that created the park and continue to act upon it; scenic features; natural visibility, both in daytime and at night; natural landscapes; natural soundscapes and smells; water and air resources; soils; geological resources; paleontological resources; archeological resources; cultural landscapes; American Indian traditional uses; historic and prehistoric sites, structures, and objects; museum collections; and native plants and animals; appropriate opportunities to experience enjoyment of the above resources, to the extent that can be done without impairing them; the park's role in contributing to the national dignity, the high public value and integrity, and the superlative environmental quality of the national park system, and the benefit and inspiration provided to the

American people by the national park system; and any additional attributes encompassed by the specific values and purposes for which the park was established.

1.4.7 Decision- making Requirements to Identify and Avoid Impairments

Before approving a proposed action that could lead to an impairment of park resources and values, an NPS decision- maker must consider the impacts of the proposed action and determine, in writing, that the activity will not lead to an impairment of park resources and values. If there would be impairment, the action must not be approved.

Impairment determinations, however, are not made for health and safety, visitor use, maintenance, operations, socioeconomic resources, or other non- natural or cultural resources topics.

Although Congress has given the National Park Service the management discretion to allow certain impacts within parks, that discretion is limited by the statutory requirement that the National Park Service must leave park resources and values unimpaired, unless a particular law directly and specifically provides otherwise. The prohibited impairment is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources or values. Although an impact to a park resource or value may constitute an impairment, an impact would be more likely to constitute an impairment if it has a major or severe adverse effect on a resource or value whose conservation is:

1. Necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
2. Key to the natural or cultural integrity of the park; or
3. Identified as a goal in the park's general management plan or other relevant NPS planning documents.

Impairment may result from NPS activities in managing the park, visitor activities, or activities undertaken by concessionaires, contractors, and others operating in the park. A determination on impairment is made for each of the resources under each alternative.

NATURAL RESOURCES

GEOLOGY, GEOLOGIC HAZARDS, AND SOILS

Affected Environment

Yosemite National Park covers approximately 747,956 acres within the central portion of the Sierra Nevada, the highest and most continuous mountain range in California. Yosemite National Park is a geologically active area where natural forces continue to shape the landscape. Geologic hazards, such as earthquakes and landslides, can present potentially harmful conditions for people and structures in the park. Occasional rockfall is a concern near Curry Village in Yosemite Valley, as YI students have typically stayed at the village during a portion of their program. Between October 2008 and January 2009, students were moved out of traditionally used accommodations at Curry Village because of recent rockfall, which had jeopardized the safety of students and chaperones.

More than 50 soil types are found within the park; general or local variations depend upon glacial history, microclimatic differences, and the ongoing influences of weathering and stream erosion/deposition (NPS 1980). Soils of the Yosemite National Park region are primarily derived from underlying granitic bedrock and are of similar chemical and mineralogical composition. The surface soil in Yosemite National Park consists primarily of granitic sands in various stages of decomposition (Borchers 1996). The extensive glaciation of the region has resulted in typically poorly developed topsoil and soil horizons. Soils generally have low shrink-swell potential because of their minimal clay content but high erosive potential because they are generally thin and sandy.

Crane Flat Setting

Crane Flat is located at approximately 6,200 feet above mean sea level (msl). Soils in the Crane Flat area are thin, poorly developed, fine-grained sandy loam soils that originated from coarse-textured stream alluvium (deposited by water) (NPS 1991). The soil is underlain by decomposed granitic rock to about 20 feet below the surface, with granitic bedrock below the granitic rock. No unique geologic resources occur at the Crane Flat site.

The dominant soil type at the Crane Flat site is Waterwheel Humic Dystroxerepts, 15% to 45% slopes, mountain slopes, and frigid (U.S. Department of Agriculture [USDA] Natural Resources Conservation Service [NRCS] GIS layer 2008). This soil type has low shrink-swell potential. The Badger Pass–Oxyaquic Dystroxerepts association, 0% to 15% slopes, mountain valley floors, and frigid, occurs in the meadow areas in the vicinity of Crane Flat. Being oxyaquic, it is saturated at least one month per year for six out of 10 years on average.

Earthquakes, soil compaction, and soil erosion are currently concerns in the Crane Flat area. Ground shaking from earthquakes generated by seismically active fault zones on the east and west margins of the Sierra Nevada pose a hazard for the older buildings at the campus as well as for students and employees. Current automobile and human traffic at the existing campus causes soil compaction due to the thin layer of soil and hard underlying granitic rock and bedrock. Compaction reduces the ability of surface water to infiltrate the soil and increases surface runoff, eroding the thin layer of soil and creating small gullies.

Henness Ridge Setting

Henness Ridge is located approximately 6,100 to 6,200 feet above msl. Soils in the Henness Ridge area are thin, coarse-grained soils that originated from granitic rock (USDA 2007). The soil is underlain by decomposed granitic rock and bedrock. A few large outcrops of bedrock occur onsite. No unique geologic resources occur at the Henness Ridge site.

Three soil types are present at Henness Ridge: Waterwheel Humic Dystroxerepts, 15% to 45% slopes, mountain slopes, and frigid; Typic Dystroxerepts–Humic Dystroxerepts–Rock outcrop association, 15% to 45% slopes, mountain slopes, and frigid; and Typic Haploxerepts–Typic Dystroxerepts complex, 5% to 25% slopes, mountain foot slopes, and frigid (USDA NRCS GIS layer 2008). Humic soils have generally high organic content.

Environmental Consequences

Intensity Level Definitions

Impacts to geology and soils were evaluated using the process described in the introduction to this chapter. Impact threshold definitions for geology and soils are as follows:

Negligible: Effects to geology and soils, such as excavation of bedrock or removal of topsoil, would not occur or would be so slight as to be immeasurable.

Minor: Effects to geology and soils would be detectable. If mitigation is needed to offset adverse effects, it would be relatively simple to implement.

Moderate: Effects to geology and soils would be readily apparent. Mitigation would probably be necessary to offset adverse effects.

Major: Effects to geology and soils would be readily apparent and would substantially change the soil or geologic characteristics of the area. Extensive mitigation would probably be necessary to offset adverse effects, and its success could not be guaranteed.

Impairment

Definition

A permanent adverse change would occur to geology and soils in Yosemite National Park, affecting the resource to the point that the park's purposes could not be fulfilled and enjoyment by future generations of geology or soils would be precluded.

Impacts under Alternative 1 (No- Action Alternative)

Under the No- Action Alternative, no new development would occur at the campus at Crane Flat, but necessary maintenance and repairs as well as ground- disturbing activities from day- to- day activities and operation would continue. Construction- related impacts to geology and soils would not occur; however, operation- related impacts would include potential hazards from earthquakes, soil disturbance and compaction, and potential soil erosion.

Operation- related Impacts on Geologic Hazards. Hazards from unavoidable seismic ground shaking would continue to potentially affect the campus at Crane Flat under Alternative 1, resulting in a site- specific, long- term, negligible, adverse impact. Structurally vulnerable or failing buildings would not be replaced with new buildings; thus, the potential for building damage and injury to people during a seismic event would remain.

Impact Significance. Site- specific, long- term, negligible, adverse impact.

Operation- related Impacts on Soils. Vehicle and pedestrian use at the environmental education campus at Crane Flat has led to localized compaction of onsite soils and may have contributed to an increase in the loss of topsoil. This potential soil erosion would continue under Alternative 1.

Impact Significance. Site- specific, long- term, minor, adverse impact.

Conclusion. No construction- related impacts would occur. Operation- related impacts would include possible potential structural damage from ground- shaking and minor impacts to soils.

Impairment. Though there would be continued soil disturbance and compaction, geology and soils under this alternative would not be impaired.

Impacts under Alternative 2 (Crane Flat Redevelopment)

Under Alternative 2, the Yosemite Institute would redevelop the Crane Flat campus, including removing old buildings and structures and constructing new buildings in a slightly larger footprint. Campus use is also projected to increase with an increase in student capacity. Construction- related impacts would include soil disturbance and removal of topsoil. Operation- related impacts would be similar in nature to those described under Alternative 1 impacts and would include earthquake hazards, soil disturbance and compaction, and potential soil erosion.

Construction- related Impacts on Soils. Construction activities would include removal of old buildings and structures and construction of new buildings. Some grading and leveling would be required prior to new building construction, but the new buildings would use post- and- beam building foundations and little excavation would be required. These activities would disturb surface soils and expose them to wind and water erosion. In addition, use of heavy machinery and trucks during construction could compact soils in previously undisturbed areas and lead to erosion of the thin topsoil as a result of reduced infiltration and increased surface runoff. A minor loss of topsoil would also occur in previously undeveloped areas. Impacts on soils would be restricted to the development footprint, or area of disturbance, at Crane Flat.

Soils at Crane Flat are susceptible to erosion and compaction impacts because they form a thin, loose layer over decomposed granite and are sandy with high erosion potential. The sandy topsoil is easily eroded by surface water runoff and disturbance by people and vehicles, and soil disturbance can result in the formation of rills (narrow and shallow incisions in the ground) and the loss of topsoil material. Decomposed granite, due to its coarse- to fine- grained texture, is easily compacted. This ability to readily compact can be detrimental because it accelerates soil erosion and water runoff.

Site restoration and cleanup would occur following construction to restore the original contours and native vegetation in disturbed areas. These efforts would reduce long- term impacts on the soils from construction activities by restoring native topsoil and vegetation to protect the soils and returning the disturbed areas to predisturbance, or better, conditions.

Impact Significance. Site- specific, short- term, minor, adverse impact.

Operation- related Impacts on Geologic Hazards. Most existing buildings at the campus would be replaced, including many of the structurally failing buildings that pose safety concerns in the event of seismic activity on the margins of the Sierra Nevada that causes ground- shaking at the campus. Historic structures that remain would be susceptible to earthquake damage and would continue to pose a safety concern. All new buildings would be designed and constructed to conform with current building codes to withstand ground-shaking during an earthquake. Redevelopment of the campus would reduce the potential for safety hazards or structural damage from ground- shaking. Because fewer students would be staying in accommodations at Curry Village, which is susceptible to rockfall, there would be a slight beneficial impact on geologic hazards in this regard under this alternative.

Impact Significance. Site- specific, long- term, negligible, adverse impact.

Operation- related Impacts on Soils. Increased use of the campus under Alternative 2 would increase foot traffic in the Crane Flat area. Within the campus itself, raised walkways would replace some of the existing at-grade footpaths, and gravel drip lines would be installed on roof drains to reduce surface water runoff and subsequent erosion of soils. The raised walkways would reduce soil disturbance and compaction in the long term by reducing foot traffic in undeveloped areas or on dirt trails. A reduction in soil compaction would have additional benefits to the soils at the campus by reducing the potential for increased soil erosion and soil loss caused by runoff over compacted soils.

Impact Significance. Site- specific, long- term, minor, adverse impact.

Conclusion. Construction- related impacts would include grading and soil disturbance from equipment and building construction. Operation- related impacts would include compaction of soils and possibly minor topsoil erosion.

Impairment. Though there would be some trenching, grading, and soil compaction related to redevelopment of the campus at Crane Flat, geology and soils under this alternative would not be impaired.

Impacts under Alternative 3 (Henness Ridge Center)

Under Alternative 3, the Yosemite Institute would develop a new campus at Henness Ridge. This would entail construction of new buildings and infrastructure, covering a project area of approximately 16 acres, and moving the environmental education program to Henness Ridge and nearby areas, including all recreational and educational activities. Construction- related impacts would include soil disturbance and removal of topsoil. Operation- related impacts would be similar in nature to those described for Alternatives 1 and 2 and would include earthquake hazards, soil disturbance and compaction, and potential soil erosion.

Construction- related Impacts on Soils. Development of a campus at Henness Ridge would require grading and leveling to construct buildings, the parking area, and other structures and would require some trenching or similar excavation for infrastructure, including the geothermal system. Grading activities would likely be more pronounced at the southern edge of the site due to the steep topography. These construction activities would disturb and remove topsoil and expose soils to wind and water erosion. Heavy machinery and trucks used during construction would compact the soils, resulting in reduced infiltration and increased runoff during periods of precipitation, which could also result in soil erosion. Construction- related impacts would be limited to the development footprint, or area of disturbance, at Henness Ridge. Soils at Henness Ridge would be susceptible to erosion, particularly along the steeper slopes, and compaction.

Impact Significance. Site- specific, short- term, minor, adverse impact.

Restoration- related Impacts on Soils. Restoration of the campus site at Crane Flat under this alternative would require heavy machinery to remove buildings, the parking lot, the septic tank, and other structures and would require some trenching or similar excavation to remove other infrastructure. These short- term activities would be as sensitive to soils as possible but may disturb and remove topsoil and expose soils to wind and water erosion in some areas. Heavy machinery and trucks used during building demolition and removal of more recent foundations may compact soils. Restoration- related impacts would be limited to the development footprint, or area of disturbance, at Crane Flat.

In the long term, the site would be revegetated with native species. Soils under the parking lot would be decompacted. Erosion potential would decrease over time, and soils at the site would naturally recover from years of trampling and from the short- term use of machinery.

Impact Significance. Site- specific, short- term, minor, adverse impact. Site- specific, long- term, moderate, beneficial impact.

Operation- related Impacts on Geologic Hazards. Building designs and construction at Henness Ridge would conform to current building codes to ensure all buildings can withstand ground- shaking associated with earthquakes. The potential for structural damage is low; however, earthquake activity would still pose a safety hazard if ground- shaking is severe enough to be felt at the Henness Ridge site.

Impact Significance. Site- specific, long- term, negligible, adverse impact.

Operation- related Impacts on Soils. Paved walkways would be used at the Henness Ridge site to discourage dirt trails and reduce the potential for foot traffic in undisturbed or undeveloped areas. Use of raised walkways would reduce soil compaction caused by concentrated foot traffic and would reduce the potential for increased soil erosion and soil loss caused by increased runoff as a result of soil compaction. Gravel drip lines below roof drains would also be used and would help minimize surface runoff and reduce the potential for soil erosion.

Impact Significance. Site- specfic, long- term, minor, adverse impact.

Conclusion. Construction- related impacts would include grading and soil disturbance from equipment and building construction. Operation- related impacts would include compaction of soils and possibly negligible topsoil erosion.

Impairment. Though there would be some trenching, grading, and soil compaction related to development of the campus at Henness Ridge, geology and soils under this alternative would not be impaired.

HYDROLOGY

Affected Environment

The NPS *Freshwater Resource Management Guidelines* requires the National Park Service to "maintain, rehabilitate, and perpetuate the inherent integrity of water resources and aquatic ecosystems." Yosemite National Park has a variety of surface water features originating from snowmelt atop the High Sierra, some of which are major attractions for visitors, such as Yosemite, Bridalveil, Nevada, and Vernal Falls. Precipitation in the lower elevations occurs either as rain or snow, which melts quickly and flows into streams. At higher altitudes, precipitation usually occurs as snow, which melts more slowly and sustains surface water flows during the spring and early summer. About 85% of the precipitation falls between November and April. December, January, and February have the highest average precipitation, with a monthly average of 6 inches in Yosemite Valley at 4,000 feet above msl. Average annual precipitation in Yosemite Valley is 36.5 inches. Annual precipitation decreases to 25 inches in El Portal at 2,000 feet above msl and increases to 70 inches in the red fir forest at 6,000 to 8,000 feet above msl (Eagan 1998).

Yosemite National Park is drained by two major watersheds: the Tuolumne and the Merced, both of which are sub- basins of the San Joaquin River Hydrologic Region. The Tuolumne and Merced River systems originate along the crest of the Sierra Nevada, carving river canyons 3,000 to 4,000 feet deep on their paths to the Central Valley. The Tuolumne River drains the entire northern portion of the park, an area of approximately 435,000 acres (681 square miles). The Merced River basin begins in the southern region of the park and drains the southern one- third, or 250,000 acres (391 square miles), within the boundaries of the park. Crane Flat straddles Tuolumne River and Merced River drainages. The Henness Ridge site is located within the Merced River basin. The park is located within the Yosemite Valley Groundwater Basin of the San Joaquin River Hydrologic Region (California Department of Water Resources [CDWR] 2005).

Crane Flat Setting

Crane Flat is located approximately 1,000 feet east of the headwaters of North Crane Creek. North Crane Creek flows to the north and eventually joins the South Fork of the Tuolumne River. Crane Flat is situated on a hydrologic divide between North Crane Creek (Tuolomne Basin) and Crane Flat Meadow (Merced Basin) and is unusual in that there is an abundance of springs, wetlands, and meadows in the area that have developed from water seeping up through the area's fractured bedrock (Figure 3- 1). These features are more common in topographic depressions and basins. At Crane Flat Meadow, a wetland meadow adjacent to the site, the topography is relatively level and the water table is very near the surface, allowing water to accumulate in a basin- like depression and feed the south- flowing Crane Creek. Crane Creek, unlike North Crane Creek, flows toward the Merced River and is located within the Merced River watershed.

Stormwater or snowmelt runoff originating from Crane Flat either flows to North Crane Creek or infiltrates the soil to contribute to the groundwater system. Groundwater flows laterally (referred to as base flow) along a downward- sloping gradient towards North Crane Creek or Crane Flat Meadow. Base flow occasionally infiltrates deeper into the earth to fill fractures in the granite. These fractures provide groundwater sources for wells in the park, including the existing campus.

The springs, groundwater table, Crane Flat Meadow, and Crane Creek are all hydraulically connected and interdependent. A groundwater well in Crane Flat Meadow provides water to the existing environmental education campus as well as a nearby gas station and campground. The water table level beneath Crane Flat Meadow has declined seasonally from excess pumping of the groundwater well (for the campus and other facilities in the area) and/or drought conditions; the wetland soils occasionally dry out and become aerobic, affecting wetland plant species (Cooper and Wolf 2006). Because the current campus footprint is heavily used, and soils have become more compact over time, there is likely slightly more surface runoff and less surface water infiltration than in areas that have not been disturbed.

Henness Ridge Setting

The Henness Ridge site is located in an undeveloped area situated on a drainage divide between Indian Creek and Elevenmile Creek (Figure 3- 2). Indian Creek flows northward to join the Merced River near El Portal. Elevenmile Creek flows southwest to the Bishop Creek, which joins the South Fork of the Merced River west of the park boundary. Elevenmile Meadow is located approximately 1 mile south, or downgradient, of the Henness Ridge site. Stormwater or snow melt runoff originating atop Henness Ridge flows either north to Indian Creek or south to Elevenmile Creek. The proposed campus would largely be located on the southwestern slope of Henness Ridge, with most runoff flowing in that direction toward Elevenmile Meadow. Runoff from the site is currently minimal due to the high permeability of the soils. Surface water typically infiltrates the soils and contributes to the groundwater system instead of flowing on the surface toward the nearby creeks. During high- intensity storms, stormwater runoff may contribute to creek flows if the soils' infiltration capacity is exceeded.

Indian Creek is the site of a groundwater well that would provide water for the campus and for fire protection in the area. The groundwater aquifer to be tapped is many hundreds of feet below the surface of Indian Creek. The surface water system would be disconnected, ending reliance on Indian Creek for the Chinquapin water supply.

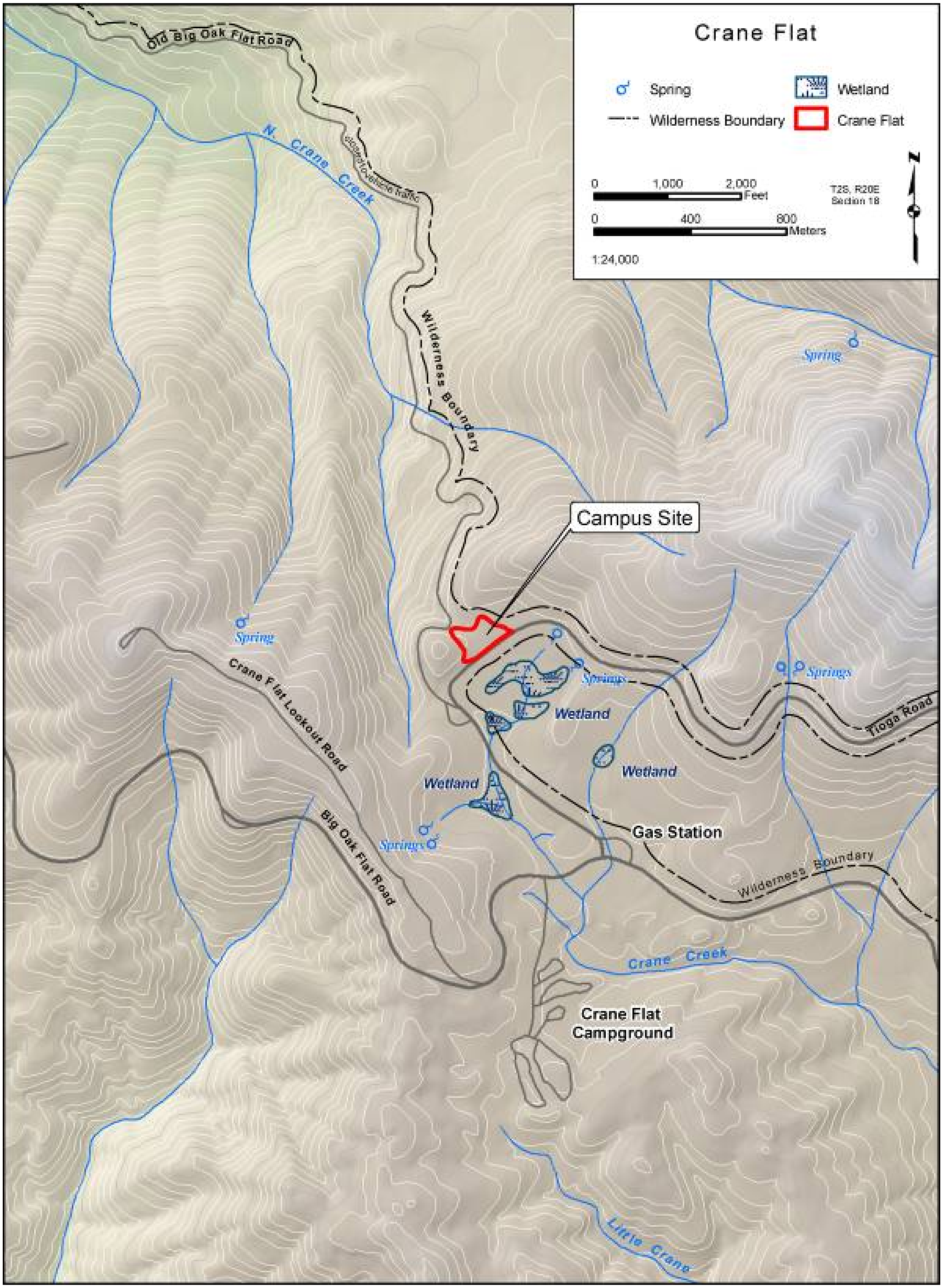

Figure 3-1. Crane Flat Surface Hydrology

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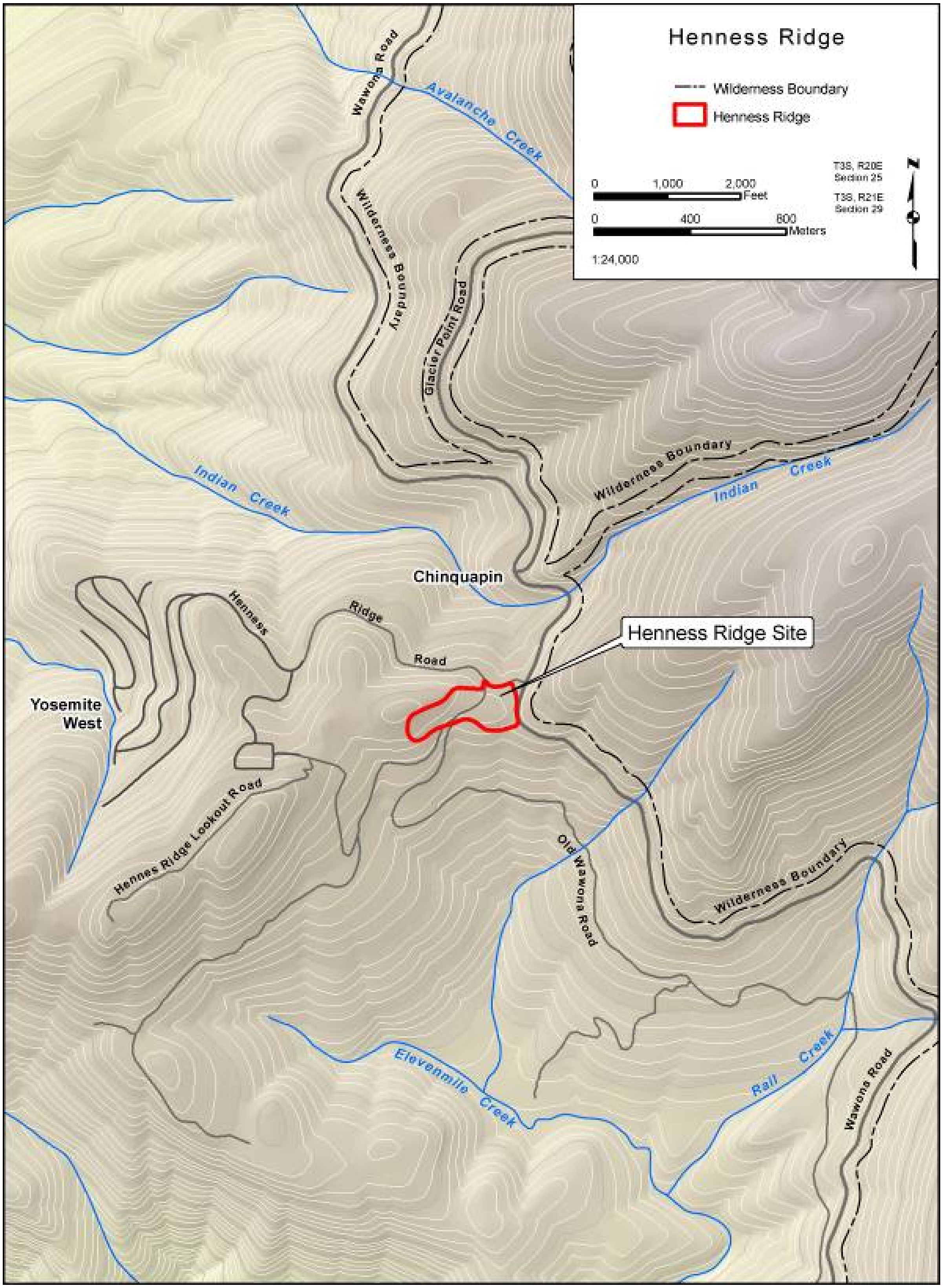

Figure 3-2. Henness Ridge Surface Hydrology

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Environmental Consequences

Intensity Level Definitions

Impacts to hydrology were evaluated using the process described in the introduction to this chapter. Impact threshold definitions for hydrology are as follows:

Negligible: Hydrology of the area would not be affected, or effects would not be measurable. Any effects to the hydrologic regime would be slight and short- term.

Minor: Effects to hydrology, such as an increase or decrease in surface or groundwater flow, would be detectable. If mitigation were needed to offset adverse effects, it would be relatively simple to implement.

Moderate: Effects to hydrology would be readily apparent. Mitigation would probably be necessary to offset adverse effects.

Major: Effects to hydrology would be readily apparent and would substantially change the hydrologic regime over the area. Extensive mitigation would probably be necessary to offset adverse effects, and its success could not be guaranteed.

Impairment

Definition

A permanent adverse change would occur to the hydrologic regime in Yosemite National Park, affecting the resource to the point that the park's purposes could not be fulfilled and enjoyment by future generations of the hydrologic resources of the park would be precluded.

Impacts under Alternative 1 (No- Action Alternative)

Under the No- Action Alternative, the campus at Crane Flat would remain in its existing condition. There would be no increase in impervious surfaces or new construction; thus, no construction- related impacts would occur. Groundwater pumping for uses during day- to- day activities and operations would continue at the approximate volume of 1,600 gallons per day (gpd). Operation- related impacts would include reduced surface and groundwater flows as a result of ongoing pumping.

Operation- related Impacts on Surface Water. Continued groundwater pumping for campus use would reduce the groundwater system's contribution to surface flows in Crane Creek and surface water hydrology at Crane Flat Meadow. This would indirectly affect surface water volume in these areas.

Impact Significance. Local, long- term, minor, adverse impact.

Operation- related Impacts on Groundwater. Continued groundwater pumping would seasonally reduce the volume of water in the groundwater aquifer and could lower the groundwater table. The Yosemite Institute has taken several steps, such as installing some water- conserving toilets, to reduce water consumption at the campus and in fact the campus averages just 18 gallons per person per day. The total volume of water pumped from the Crane Flat Meadow well is considerable because it provides water for the other facilities nearby. Continued compaction of the soils on the campus also inhibits surface water infiltration to groundwater.

Impact Significance. Local, long- term, moderate, adverse impact.

Conclusion. No construction- related impacts would occur. Operation- related impacts would include measurably reduced surface flows in Crane Creek and at Crane Flat Meadow and a reduced groundwater table.

Impairment. Though there would be some adverse effects to hydrology from continued groundwater withdrawal, hydrology under this alternative would not be impaired.

Impacts under Alternative 2 (Crane Flat Redevelopment)

Under Alternative 2, the Yosemite Institute would redevelop the Crane Flat campus and increase the development footprint, resulting in an increase of impervious area by about 30,000 square feet (0.7 acre). In addition, campus use would be increased, and the demand for groundwater would increase to a peak average daily demand of 8,610 gpd during the winter months and 4,305 gpd during the summer. Construction- related impacts would include a temporary increase in stormwater runoff and reduced groundwater infiltration. Operation- related impacts would include an increase in stormwater runoff, reduced groundwater infiltration, and reduced surface and groundwater flows as a result of pumping.

Construction- related Impacts on Surface and Groundwater. During the construction phase, the removal of impervious surfaces associated with existing buildings could temporarily increase groundwater infiltration by exposing soils; however, soil disturbance and compaction from such activities could also increase the potential for stormwater to run off the site and reduce the potential for groundwater infiltration. A temporary change in surface runoff during construction would not be noticeable in Crane Creek or Crane Flat Meadow and would have a minimal effect on groundwater infiltration at the Crane Flat site.

Impact Significance. Local, short- term, negligible, adverse impact.

Operation- related Impacts on Surface Water. Increased surface runoff on both sides of the drainage divide would occur as a result of an increase in impervious surfaces. This may lead to a greater contribution to surface water volume.

Changes to the groundwater table from increased pumping could have adverse effects on groundwater and indirectly nearby creeks and Crane Flat Meadow. A lowering of the water table could reduce surface flows in nearby creeks or ponding at Crane Flat Meadow. According to Roche (2006), pumping rates from the well at Crane Flat can be at approximately 70,000 gallons per month (2,333 gpd) while still sustaining the wet environment present within Crane Flat Meadows. The projected demand for the redeveloped campus would exceed this amount.

During extended dry periods in which surface water inputs to the water table aquifer are limited, limiting pumping rates to approximately 40,000 gallons per month (1,333 gpd) would be required to sustain the moisture content of the peat in the fen system.

Impact Significance. Local, long- term, moderate, adverse impact.

Operation- related Impacts on Groundwater. An increase in impervious surface at the campus would reduce groundwater infiltration at the site; however, the surface runoff would likely infiltrate downstream of the site in undisturbed, natural areas. The groundwater aquifer would not experience a decline due to a change in infiltration patterns.

An increase in groundwater pumping could lower the water table and reduce the volume of water in the groundwater aquifer. There could be an increase in infiltration due to septic tank leach fields.

Impact Significance. Local, long- term, moderate, adverse impact.

Conclusion. Construction- related impacts would include a temporary a change in surface runoff. Operation-related impacts would include reduced surface flows in Crane Creek and at Crane Flat Meadow and a lowering of the water table.

Impairment. Though there would be some adverse effects to hydrology from continued groundwater withdrawal, hydrology under this alternative would not be impaired.

Impacts under Alternative 3 (Henness Ridge Center)

Under Alternative 3, the Yosemite Institute would establish a new campus location and education program at Henness Ridge and restore the Crane Flat campus. The Henness Ridge campus would have a development footprint of approximately 16 acres, with an impervious area of approximately of 60,000 square feet (1.4 acres). Campus use would generate a peak average daily demand of 11,480 gallons of water per day during the winter months and 5,740 gpd during the summer. The source of water would be a groundwater well at Indian Creek. Construction- related impacts would include increased surface runoff. Operation- related impacts would include increased surface runoff and reduced groundwater infiltration.

As has already been determined, a slight increase in groundwater withdrawal from the proposed well at Indian Creek would have not have a measurable effect on the water table or on nearby wells.

Construction- related Impacts on Surface Water and Groundwater. Surface water flows would likely not be measurably affected by construction activities. Groundwater, if used for construction, would not be measurably affected.

Impact Significance. Local, short- term, negligible, adverse impact.

Restoration- related Impacts on Surface Water and Groundwater. The Crane Flat campus site would be restored to essentially natural conditions and would include removal of impervious surfaces on the campus site and removal of the groundwater pumping operation in the Crane Flat meadow area. Removal of impervious surfaces would increase water infiltration, reduce stormwater runoff, and result in improved surface water quality in surrounding streams and wetlands. Removal of the groundwater pumping operation would eliminate reduction of the groundwater table and surface water supplied to Crane Flat Meadow. The site restoration and reduction of groundwater pumping would result in beneficial impacts to surface and groundwater resources.

Impact Significance. Local, long- term, major, beneficial impact.

Operation- related Impacts on Surface Water. Increased runoff from increased impervious areas would slightly increase flows toward Elevenmile Meadow (possibly leading to indirect impacts such as erosion of banks and potential for flooding).

Impact Significance. Local, long- term, negligible, adverse impact.

Operation- related Impacts on Groundwater. A slight reduction in groundwater infiltration from an increase in impervious area could occur. Impacts to the groundwater table and aquifer from pumping water beneath Indian Creek would be negligible. There could be an increase in infiltration due to septic tank leach fields.

Impact Significance. Local, long-term, negligible, adverse impact.

Conclusion. Construction-related impacts would include temporary increased runoff. Operation-related impacts would include increased runoff toward Elevenmile Meadow and withdrawal of groundwater beneath Indian Creek, and infiltration (80%) of this water (in the form of wastewater).

Impairment. Though there would be some withdrawal of groundwater from Indian Creek, hydrology under this alternative would not be impaired.

WATER QUALITY

Affected Environment

Surface and groundwater in the park provide beneficial uses for park visitors and downstream users outside of the park's boundaries. Typical uses of these resources include consumption, agricultural and municipal irrigation, recreational activities, and fish and wildlife habitat. State-adopted water quality control plans (Basin Plans) identify beneficial uses and establish water quality objectives to achieve or maintain those uses. Water quality objectives are established for the reasonable protection of beneficial uses of water within a specific area.

Surface waters in the park are of good quality, although human activity has adversely affected water quality by introducing pollutants to surface waters and disturbing soils and stream banks, leading to erosion and increased sediment in the water (NPS 1994). Areas such as stream banks are prone to concentrated visitor use, which can lead to soil compaction, stream bank erosion, and loss of vegetation. Runoff from roads and parking lots and the use of vehicles can distribute water pollutants such as organic chemicals and heavy metals that may collect on land surfaces. Recreational activities such as horseback riding, swimming, and hiking can lead to the introduction of organic, physical, and chemical pollutants into surface water. Construction activities generate dust, and petroleum releases from equipment and vehicles can pollute the surface waters. Wastewater treatment facilities in the park can also discharge pollutants into surface waters, and wildland fires can contribute to reduced water quality by increasing sediment contributions to surface water, altering surface drainage patterns, and discharging concentrations of chemical and biological constituents into water bodies.

Generally, groundwater throughout the San Joaquin River Hydrologic Region is of good quality, and groundwater in the Yosemite Valley Groundwater Basin in particular is considered to be of excellent quality (CDWR 2004). Several locations in Yosemite Valley have groundwater with high concentrations of naturally occurring elements such as iron, but groundwater quality is most affected by human activities. There are a number of known leaking underground storage tanks in various stages of cleanup within the park boundaries (Central Valley Regional Water Quality Control Board [RWQCB] 2008), some of which have the potential to affect groundwater quality. A major constituent of concern for the region is total dissolved solids; however, CDWR (2004) reports measurements taken in the Yosemite Valley Groundwater Basin range from 43 to 73 milligrams per liter (mg/L), well below the secondary maximum concentration level for drinking water standard of 500 mg/L.

Crane Flat Setting

Water quality is important in the Merced River and Tuolumne River watersheds to which the Crane Flat site drains. These rivers are used for multiple beneficial uses (Table 3- 1) and are managed accordingly in the Basin Plan (Central Valley RWQCB 2007). Water quality studies in the park have reported high- quality surface waters in most areas with human use affecting more visited and developed areas (NPS 2004). Surface waters that are more sensitive to human disturbance have less dissolved solids, or are more diluted (Clow et al. 1996). The Merced River and Tuolumne River watersheds have high- quality surface water with generally low dissolved solids, low electrical conductivity, near- neutral pH, low alkalinity, and low nutrient concentrations (NPS 1994). Some surface waters in these watersheds have been reported to contain *Giardia lamblia* and fecal coliform, which reduces their quality and limits direct consumption by humans (Williamson et al. 1996b). Due to the low alkalinity of the surface waters downstream of the Crane Flat site, the ability of the streams to absorb water chemistry changes or additions (i.e., pollutants) is limited.

Table 3-1. Beneficial Uses of Receiving Waters (Tuolumne and Merced Rivers)

Surface Water	Beneficial Use	Applicable to Waters
Tuolumne River	Municipal and Domestic	Yes
	Agriculture	Yes
	Industry Process, Service and Power	Yes
	Recreation – Contact and Noncontact	Yes
	Warm Freshwater Habitat	Yes
	Cold Freshwater Habitat	Yes
	Warm Water Migration	No
	Cold Water Migration	No
	Warm Water Spawning	No
	Cold Water Spawning	No
	Wildlife Habitat	Yes
	Navigation	No
Merced River	Municipal and Domestic	Potential
	Agriculture	Yes
	Industry Process, Service and Power	Yes
	Recreation – Contact and Noncontact	Yes
	Warm Freshwater Habitat	Yes
	Cold Freshwater Habitat	Yes
	Warm Water Migration	No
	Cold Water Migration	No
	Warm Water Spawning	No

Table 3-1. Beneficial Uses of Receiving Waters (Tuolumne and Merced Rivers)

Surface Water	Beneficial Use	Applicable to Waters
	Cold Water Spawning	No
	Wildlife Habitat	Yes
	Navigation	No

Groundwater quality is generally good in the Merced River basin (NPS 2000b); groundwater is the sole source of potable water for the existing environmental education campus at Crane Flat. Federal regulations require that potable water systems that rely on groundwater be continually monitored and operated within set levels for turbidity, waterborne pathogens, and other potential pollutants. The old septic field at Crane Flat may have affected local water quality because it leaked; however, this field has been disengaged, and water quality continues to be of suitable quality for potable uses.

Henness Ridge Setting

The Henness Ridge site drains to the Merced River via Indian Creek and to the South Fork of the Merced River via Elevenmile Creek. Water quality within the South Fork watershed is very similar to that of the main stem of the Merced River, as described under the Crane Flat setting. Water quality is excellent in most areas, although some water quality stressors have been exhibited near human development. Groundwater quality at the Henness Ridge site is likely of good quality because it is in the Merced River basin. No known sources of pollutants exist in the area that affects groundwater quality.

Environmental Consequences

Intensity Level Definitions

Impacts to water quality were evaluated using the process described in the introduction to this chapter. Impact threshold definitions for water quality are as follows:

Negligible: Water quality would not be affected, or effects would not be measurable and would not affect beneficial uses of receiving waters.

Minor: Effects to water quality would be detectable and may affect beneficial uses of receiving waters. If mitigation is needed to offset adverse effects, it would be relatively simple to implement.

Moderate: Effects to water quality would be readily apparent and would affect beneficial uses of receiving waters. Mitigation would probably be necessary to offset adverse effects.

Major: Effects to water quality would be readily apparent and would substantially change beneficial uses of surface or groundwater. Extensive mitigation would probably be necessary to offset adverse effects, and its success could not be guaranteed.

Impairment

Definition

A permanent adverse change would occur to water quality in Yosemite National Park, affecting the resource to the point that the park's purposes could not be fulfilled and enjoyment by future generations of water resources would be precluded.

Impacts under Alternative 1 (No- Action Alternative)

Under the No- Action Alternative, the campus at Crane Flat would remain in its existing condition. There would be no increase in impervious surfaces or new construction; thus, no construction- related impacts would occur. Operation- related impacts would include discharge of pollutants into surface and groundwaters.

Operation- related Impacts on Surface Water Quality. Pollutants from human activities can collect on parking lots and paved areas within the campus. Stormwater runoff can carry these pollutants to the nearby North Crane Creek and Crane Flat Meadow, but the distance to these surface waters likely reduces the amount of pollutants because they are absorbed into the soil or vegetation along the way, and water quality effects are not measurable. Also, the pollutants do not likely reach the receiving waters (Merced or Tuolumne Rivers) and would not affect beneficial uses of these rivers.

Impact Significance. Regional, long- term, negligible, adverse impact.

Operation- related Impacts on Groundwater Quality. Use of the existing septic system and leach field at the campus would continue to result in minimal impacts to groundwater quality because it has been upgraded to pre- treatment to prevent leaking and improve operation. Other campus operations would not affect groundwater quality or the quality of potable water pumped from the well at Crane Flat Meadow.

Impact Significance. Local, long- term, negligible, adverse impact.

Conclusion. No construction- related impacts would occur. Operation- related impacts would include negligible pollutant discharge to surface waters and negligible wastewater effects on groundwater.

Impairment. Though there would be some stormwater runoff from the campus and negligible adverse effects to water quality, water quality under this alternative would not be impaired.

Impacts under Alternative 2 (Crane Flat Redevelopment)

Under Alternative 2, redevelopment of the Crane Flat campus would involve removal of some existing buildings and the construction of new buildings. Campus use would be increased with an increase in student capacity. Construction- related impacts on water quality would include discharge of pollutants into surface waters. Operation- related impacts on water quality would include discharge of pollutants into surface and groundwaters.

Construction- related Impacts on Surface Water Quality. Construction activities could result in stormwater runoff laden with sediment or pollutants from eroded soil, waste, or hazardous materials used on the construction site. Impacts to downstream surface waters (i.e., Crane Creek, North Crane Creek, and Crane Flat Meadow) would occur during periods of rain, while soil is exposed, and prior to redevelopment and the site restoration and cleanup phase. Water quality impacts might be noticeable in the nearby surface waters, but they would not likely affect the receiving waters further downstream.

Impact Significance. Local, short-term, minor, adverse impact.

Operation-related Impacts on Surface Water Quality. Redevelopment of the campus would increase the amount of impervious surfaces and increase runoff, which has the potential to carry pollutants that have collected on the surface and discharge the pollutants into nearby creeks and surface waters. Water quality impacts would be similar to construction-related impacts, but operation-related impacts would be longer term; thus, they would have a greater potential to affect beneficial uses in downstream surface waters. Due to the small area of the campus and ability of the soils and vegetation surrounding the campus to absorb some pollutants, long-term impacts on downstream surface water quality in North Crane Creek and Crane Flat Meadow would not be noticeable or measurable and would not likely affect beneficial uses of the receiving waters.

Impact Significance. Regional, long-term, negligible, adverse impact.

Operation-related Impacts on Groundwater Quality. Wastewater generation would increase with increased use of the campus, and the wastewater would be directed to the existing septic tank and leach field. The existing septic system would be upgraded/enlarged. Despite the increased quantity of wastewater, pollutants would not be expected to infiltrate into the groundwater and reduce the quality of groundwater in the area because the system has been designed to prevent leaks. Groundwater quality in the vicinity of Crane Flat would not be affected by pollutants from the campus.

Impact Significance. Local, long-term, negligible, adverse impact.

Conclusion. Construction-related impacts would include minor increased pollutants in stormwater runoff discharged to nearby surface waters. Operation-related impacts would include negligible pollutant discharge to surface waters and negligible wastewater effects on groundwater.

Impairment. Though there would be some stormwater runoff from the campus and some adverse effects to water quality, water quality under this alternative would not be impaired.

Impacts under Alternative 3 (Henness Ridge Center)

Under Alternative 3, the Yosemite Institute would establish a new campus location and program at Henness Ridge, including construction of buildings and shifting activities and uses to the Henness Ridge area, and the Crane Flat Campus would be restored to essentially natural conditions. Construction- and operation-related impacts on water quality would be similar in nature to the impacts described for Crane Flat; however, the specific effects on the resources would be different due to the different location and surface features. Construction-related impacts would include discharge of pollutants into nearby surface waters. Operation-related impacts would include discharge of pollutants into surface and ground waters.

Construction-related Impacts on Surface Water Quality. Construction activities could result in stormwater runoff laden with sediment or pollutants from eroded soil, waste, or hazardous materials used on the construction site. Impacts to downstream surface waters (i.e., Indian Creek and Elevenmile Creek) would occur during periods of rain, while soil is exposed, and prior to redevelopment and the site restoration and cleanup phase. Water quality impacts might be noticeable in the nearby surface waters, but they would not likely affect the receiving waters further downstream.

Impact Significance. Local, short- term, minor, adverse impact.

Restoration- related impacts on Surface Water Quality. Restoration of the Crane Flat Campus would include removal of all structures, infrastructure, and paved surfaces in the campus area. The site would be restored to essentially natural conditions using approved restoration techniques and native vegetation. Removal if impervious surfaces will increase water infiltration on the site and decrease storm water runoff, resulting in beneficial impacts to surface water quality.

Impact Significance. Local, long- term, minor, beneficial impact.

Operation- related Impacts on Surface Water Quality. Development of a campus at Henness Ridge would increase the amount of impervious surfaces and increase runoff, which has the potential to carry pollutants that have collected on the surface and discharge the pollutants into nearby creeks and surface waters. Water quality impacts would be similar to construction- related impacts, but operation- related impacts would be longer term; thus, they would have a greater potential to affect beneficial uses in downstream surface waters. Due to the small area of the campus and ability of the soils and vegetation surrounding the campus to absorb some pollutants, long- term impacts on downstream surface water quality in Indian Creek and Elevenmile Creek would not be noticeable or measurable and would not likely affect beneficial uses of the receiving water.

Impact Significance. Regional, long- term, negligible, adverse impact.

Restoration- related Impacts on Groundwater Quality. Restoration of the Crane Flat campus would include removal of the wastewater treatment plant and leach field that provides a negligible adverse impact to groundwater quality. Removal of this facility will provide a negligible beneficial impact to groundwater resources.

Impact Significance. Local, long- term, negligible, beneficial impact.

Operation- related Impacts on Groundwater Quality. Wastewater generated at the Henness Ridge campus would be directed to an onsite wastewater treatment plant and associated drain field. Pollutants from the wastewater would not be expected to infiltrate into the groundwater because the design of the system would allow adequate treatment of the wastewater prior to discharging to the drain field. Groundwater quality would not be affected by wastewater from the Henness Ridge campus.

Impact Significance. Local, long- term, negligible, adverse impact.

Conclusion. Construction- related impacts would include minor increased pollutants in stormwater runoff and being discharged to nearby surface waters. Operation- related impacts would include negligible pollutant discharge to surface waters and negligible wastewater effects on groundwater.

Impairment. Though there would be some stormwater runoff from the campus and negligible to minor adverse effects to water quality, water quality under this alternative would not be impaired.

WETLANDS

Affected Environment

Generally, wetlands are lands where saturation with water is the dominant factor determining the nature of soil development and the types of plant and animal communities living in the soil and on its surface. Wetlands have many distinguishing features, the most notable of which are unique soils, saturated for at least part of the year, and vegetation adapted to or tolerant of saturated soils. Wetlands are considered highly valued resources because they perform a variety of hydrological and ecological functions vital to ecosystem integrity.

Aquatic and riparian systems are the most altered and impaired habitats of the Sierra Nevada (UC Davis 1996). Montane meadows often meet the criteria of wetlands. There are many meadows at mid- elevations in the park. Montane meadows of the Sierra Nevada are typically found in glaciated basins of the subalpine zone, but some meadows are scattered at elevations as low as 4,000 feet above msl in the northern part of the range, and 6,000 feet in its southern portion (Whitney 1979 in Kattelmann and Embury 1996). Subalpine meadows make up a greater proportion of the landscape at elevations above 6,000 feet (Holland 1986). In general, meadows act as floodplains, capable of reducing peak downstream flows by detaining large volumes of water. As a result, sediment deposits in meadows and adds mass and nutrients (Kattelmann and Embury 1996). Wetlands in the Sierra Nevada have been drained since the earliest settlers attempted to “reclaim” meadows and other seasonally wet areas with the intent of improving forage conditions and to permit agriculture (Hughes 1934 in Kattelmann and Embury 1996).

The Cowardin system (1979) is used as the basis for wetland classification and protection by the National Park Service. The Cowardin system classifies wetlands based on the type of vegetative cover and life form, flooding regime, and substrate material. Jurisdictional wetlands are delineated and classified in accordance with Section 404 of the Clean Water Act. Cowardin wetlands include jurisdictional wetlands, but may also include certain non- vegetated sites lacking soil, if they meet specific criteria.

Crane Flat Setting

Wetlands in the vicinity of Crane Flat are broadly classified as palustrine in nature and include palustrine emergent (montane meadow per Sawyer and Keeler Wolf 1995) and palustrine scrub shrub communities. No riparian communities occur within the immediate area.

Wet montane meadows at Crane Flat are defined as palustrine emergent wetland and include three specific wetlands: a 0.25- acre wetland adjacent to the Crane Flat site, a 1.35- acre wetland at Crane Flat Meadow, and a 3- acre wetland approximately 150 feet from Tioga Road (Figure 3- 3). Each of these wetlands displays typical palustrine emergent wetland characteristics, such as loamy, well- drained soils; seasonal saturation from snowmelt; and vegetation dominated by grasses, sedges, rushes, and perennial herbs. These wetlands are considered high- quality wetlands because they are hydrologically connected to Crane Creek and other meadows and support native plant species. Meadows play a particularly critical role in the Yosemite National Park ecosystem. High spring flows create wet areas in side channels, low- lying wetlands, meadows, and cutoff channels. These areas support a concentration of organic matter, nutrients, microorganisms, and aquatic invertebrates throughout the relatively dry summer. When the flush of winter or spring flooding occurs, this stored aquatic biomass is washed into river channels, forming the base of the aquatic food chain.

The wetland immediately adjacent to the Crane Flat campus site is moderately disturbed due to occasional trampling, and as a result, has exposed bare patchy areas.

Palustrine scrub shrub is found sporadically within the montane meadow wetlands in the vicinity of Crane Flat and along Crane Creek. Willow dominates an approximately 0.6- acre palustrine scrub shrub community along the subtle bank of Crane Creek at Crane Flat Meadow. The quality of the palustrine scrub shrub is considered good due to the presence of native species and dense overstory.

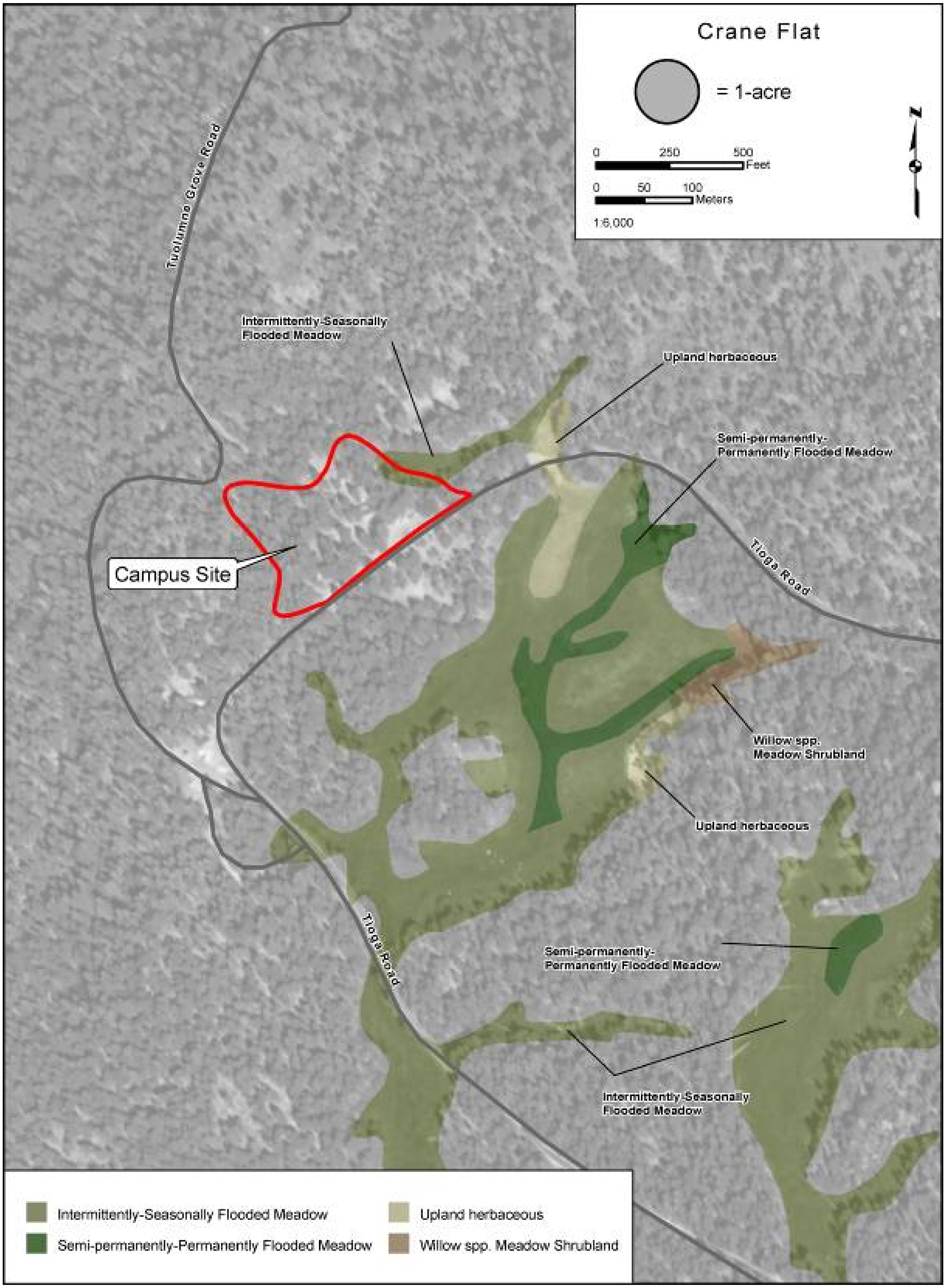

Figure 3-3. Crane Flat Wetlands

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Henness Ridge Setting

No wetland habitats have been identified at the Henness Ridge site (Acree and Grossenbacher 2006; National Wetlands Inventory 2008). Elevenmile Meadow is south of Henness Ridge and surrounds Elevenmile Creek. In the past, it has been disturbed by trampling associated with conservation camps and cattle but is relatively pristine and of high quality. It contains similar vegetation as the meadows described near Crane Flat. Indian Creek contains a riparian community.

Environmental Consequences

Intensity Level Definitions

Impacts to wetlands were evaluated using the process described in the introduction to this chapter. Impact threshold definitions for wetlands are as follows:

Negligible: Wetlands would not be affected, or effects would not result in a loss of wetland function or value.

Minor: Effects to wetlands would be detectable and could result in a loss of wetland function or value. If mitigation is needed to offset adverse effects, it would be relatively simple to implement.

Moderate: Effects to wetlands would be readily apparent and would result in a loss of wetland function or value. Mitigation would probably be necessary to offset adverse effects.

Major: Effects to wetlands would be readily apparent and would substantially change the physical characteristics or result in a significant net loss of wetland function or value. Extensive mitigation would probably be necessary to offset adverse effects, and its success could not be guaranteed.

Impairment

Definition

A permanent adverse change would occur to wetlands in Yosemite National Park, affecting the resource to the point that the park's purposes could not be fulfilled and enjoyment by future generations of the wetlands would be precluded.

Impacts under Alternative 1 (No- Action Alternative)

Under the No- Action Alternative, the campus at Crane Flat would remain in its existing condition. There would be no increase in impervious surfaces or new construction; thus, no construction- related impacts would occur. Groundwater pumping for uses during day- to- day activities and operations would continue at the approximate volume of 1,600 gpd. Operation- related impacts would include human impacts to meadows and other wetlands during recreational activities and indirect impacts to wetlands resulting from reduced surface and groundwater flows as a result of ongoing pumping.

Operation- related Impacts on Wetlands. Continued use of the existing campus at Crane Flat could result in inadvertent impacts on wetlands in the area from trampling and disturbance during recreational activities. These impacts would disturb the vegetation in the wetlands and could affect the quality of the wetlands, but campus activities would be controlled in and around these sensitive areas to minimize or prevent adverse impacts. With proper education and direction, campus users would have a local, long- term, minor, adverse impact on wetlands.

Continued groundwater pumping for campus use would reduce the groundwater system's contribution to surface water hydrology at Crane Flat Meadow. This would indirectly affect surface water volume there and could eventually lead to conversion of the wet meadow to an upland vegetation community. Therefore, ongoing pumping for the campus would result in a local, long- term, moderate, adverse impact to wetlands.

Impact Significance. Local, long- term, minor to moderate, adverse impacts.

Conclusion. No construction- related impacts would occur. Operation- related impacts would include minor visitor impacts on wetlands and moderate groundwater pumping impacts on wetlands.

Impairment. Though there would be continued adverse effects to the fen system related to periodic drying from groundwater withdrawal, wetlands under this alternative would not be impaired.

Impacts under Alternative 2 (Crane Flat Redevelopment)

Under Alternative 2, the Yosemite Institute would redevelop the Crane Flat campus and increase the development footprint, resulting in an increase of impervious area by about 30,000 square feet (0.7 acre). In addition, campus use would be increased, and the demand for groundwater would increase to a peak average daily demand of 8,610 gpd during the winter months and 4,305 gpd during the summer. Construction- related impacts would include a temporary increase in pollutants carried by stormwater runoff and reduced groundwater infiltration. Operation- related impacts would include an increase in stormwater runoff, reduced groundwater infiltration, reduced surface and groundwater flows as a result of pumping, and human impacts from trampling and disturbance.

Construction- related Impacts on Wetlands. During the construction phase, the removal of impervious surfaces associated with existing buildings could temporarily increase groundwater infiltration by exposing soils; however, soil disturbance and compaction from such activities could also increase the potential for stormwater to run off the site and reduce the potential for groundwater infiltration thereby altering the wetland hydrology. A temporary change in surface runoff during construction would not be noticeable in Crane Flat Meadow and would have a minimal effect on function or value of the wetlands at Crane Flat Meadow.

Impact Significance. Local, short- term, negligible, adverse impact.

Operation- related Impacts on Wetlands. Redevelopment of the Crane Flat campus would increase campus use and would increase the potential for inadvertent impacts on wetlands from trampling and disturbance during recreational activities, but campus activities would be controlled in and around these sensitive areas to minimize or prevent adverse impacts. With proper education and direction, campus users would have a local, long- term, minor, adverse impact on wetlands.

Changes to the groundwater table from increased pumping could have adverse effects on groundwater and indirectly on Crane Flat Meadow. A lowering of the water table could reduce surface flows in nearby creeks or ponding at Crane Flat Meadow. According to Roche (2006), pumping rates from the well at Crane Flat can be at approximately 70,000 gallons per month (2,333 gpd) while still sustaining the wet environment present within Crane Flat Meadows. The projected demand for the redeveloped campus would exceed this amount.

During extended dry periods in which surface water inputs to the water table aquifer are limited, limiting pumping rates to approximately 40,000 gallons per month (1,333 gpd) would be required to sustain wetlands.

Impact Significance. Local, long- term, minor to moderate, adverse impacts.

Conclusion. Construction- related impacts would be limited to negligible indirect stormwater runoff affecting the hydrology of the wetlands. Operation- related impacts would include minor campus user impacts on wetlands and moderate groundwater pumping impacts on wetlands.

Impairment. Though there would be continued adverse effects to the fen system related to periodic drying from groundwater withdrawal, wetlands under this alternative would not be impaired.

Impacts under Alternative 3 (Henness Ridge Center)

Under Alternative 3, a new campus would be established at Henness Ridge and the Crane Flat Campus area would be restored to essentially natural conditions. No wetlands or riparian communities are located at the Henness Ridge site. Construction- related impacts to wetlands are not expected to occur. Operation- related impacts would be limited to trampling and other human disturbances resulting from an increased use of the nearby Elevenmile Meadow.

Construction- related Impacts on Wetlands. Surface water flows and groundwater would likely not be measurably affected by construction activities, resulting in a negligible impact to nearby wetlands.

Impact Significance. Local, short- term, negligible to minor, adverse impact.

Operation- related Impacts on Wetlands. A new campus at Henness Ridge would introduce activities to the Henness Ridge area and would increase the potential for inadvertent impacts on wetlands in the area, including Elevenmile Meadow, from trampling and disturbance during recreational activities. However, campus activities would be controlled in and around sensitive wetland areas to minimize or prevent adverse impacts.

Impact Significance. Local, long- term, negligible to minor, adverse impacts.

Restoration- related Impacts on Wetlands. Under Alternative 3, the Crane Flat campus site would be restored to essentially natural conditions. Restoration would include removal of impervious surfaces, reducing storm water runoff and resulting in improved water quality in surrounding wetlands. A lessening of the groundwater demand at the Crane Flat campus site will reduce effects to the groundwater table and surface water supplied to Crane Flat Meadow. Wetland conditions at Crane Flat Meadow will improve with the increased surface and groundwater supply. The reduction of groundwater pumping would result in beneficial impacts to wetlands.

Impact Significance. Local, long- term, major, beneficial impacts.

Conclusion. Construction- related impacts would negligible. Operation- related impacts would include minor campus user impacts on nearby wetlands, and major beneficial impacts to Crane Flat Meadow.

Impairment. Wetlands at Crane Flat under this alternative would see a beneficial impact from a decrease in water consumption and thus groundwater withdrawal; wetlands under this alternative would not be impaired.

VEGETATION

Affected Environment

Elevation, latitude, topography, climate, and soils influence the distribution of vegetation in the Sierra Nevada. About 1,500 plant species, subspecies, and varieties and numerous bryophytes and lichens occur in Yosemite National Park (NPS 1997). The major vegetation zones of the Sierra Nevada form readily apparent, large-scale, north- south elevational bands along the axis of the Sierra Nevada. Major east- west watersheds that dissect the Sierra Nevada into steep canyons form a secondary pattern of vegetation. Yosemite National Park supports five major vegetation zones: chaparral/oak woodland, lower montane, upper montane, subalpine, and alpine. Straddling the crest of the Sierra Nevada is a zone of alpine vegetation that generally occurs above 11,000 feet. Subalpine vegetation occurs at 8,000 to 11,000 feet above msl. Below the subalpine zone, upper montane coniferous forests range from about 6,000 up to 10,000 feet above msl in elevation. Lower montane mixed coniferous forests range from about 3,000 to 6,700 feet above msl. Crane Flat and Henness Ridge occur in the lower montane mixed coniferous forest zone.

Crane Flat

Upland Vegetation. Sierra mixed coniferous forest is the most common vegetation community in the vicinity of the Crane Flat site (Figure 3- 4). This plant community consists of several co- dominant species, which include Jeffrey pine *(Pinus jeffreyi*), white fir (*Abies concolor*), and incense- cedar (*Calocedrus decurrens*) (Acree and Crossenbacher 2006; NPS 1997). Common associate species include sugar pine (*Pinus lambertiana*), Pacific dogwood (*Cornus nuttallii*), and buckbrush (*Ceanothus cuneatus*). California black oak is uncommon. The most common understory species are snowberry (*Symphoricarpos mollis*) and bracken fern (*Pteridium aquilinum*). The Sierra mixed coniferous forest is adapted to low- intensity, frequent fires. As a result of approximately 100 years of fire suppression, the forest structure has been altered from naturally open forest canopies to dense thickets of shade- tolerant tree species such as incense- cedar, white fir, and Douglas-fir (*Pseudotsuga menziesii*).

White fir mixed coniferous forest is a subtype of Sierra mixed coniferous forest. This plant community occurs between the Tuolumne Grove of Giant Sequoias and Crane Flat. White fir is the dominant tree species and, in some areas, is the sole species. Common associates include Douglas- fir, sugar pine, and incense- cedar. Fires within this community are extremely variable, with slow- spreading surface fires being the most typical (NPS 1997).

The nearest stand of giant sequoia mixed coniferous forest is located at Tuolumne Grove, approximately 1 mile north of Crane Flat. The Tuolumne Grove is one of the three major groves in the Park containing giant sequoia mixed coniferous forest. Students from the Yosemite Institute typically visit this grove as part of their educational experience. The Merced Grove is also located nearby. In this community, giant sequoia (*Sequoiadendron giganteum)* is a co- dominant species, along with white fir and sugar pine. Common associates include many of the species found in Sierra mixed coniferous forest, such as incense- cedar, Pacific dogwood, and buckbrush. Understory species include bracken fern and snowberry. Giant sequoia mixed coniferous forests typically require recurring, moderately intense fires to maintain healthy ecosystem function (NPS 1997). Annosus root disease is the most common problem affecting the trees, causing root decay in giant sequoia and white fir (NPS 1997).

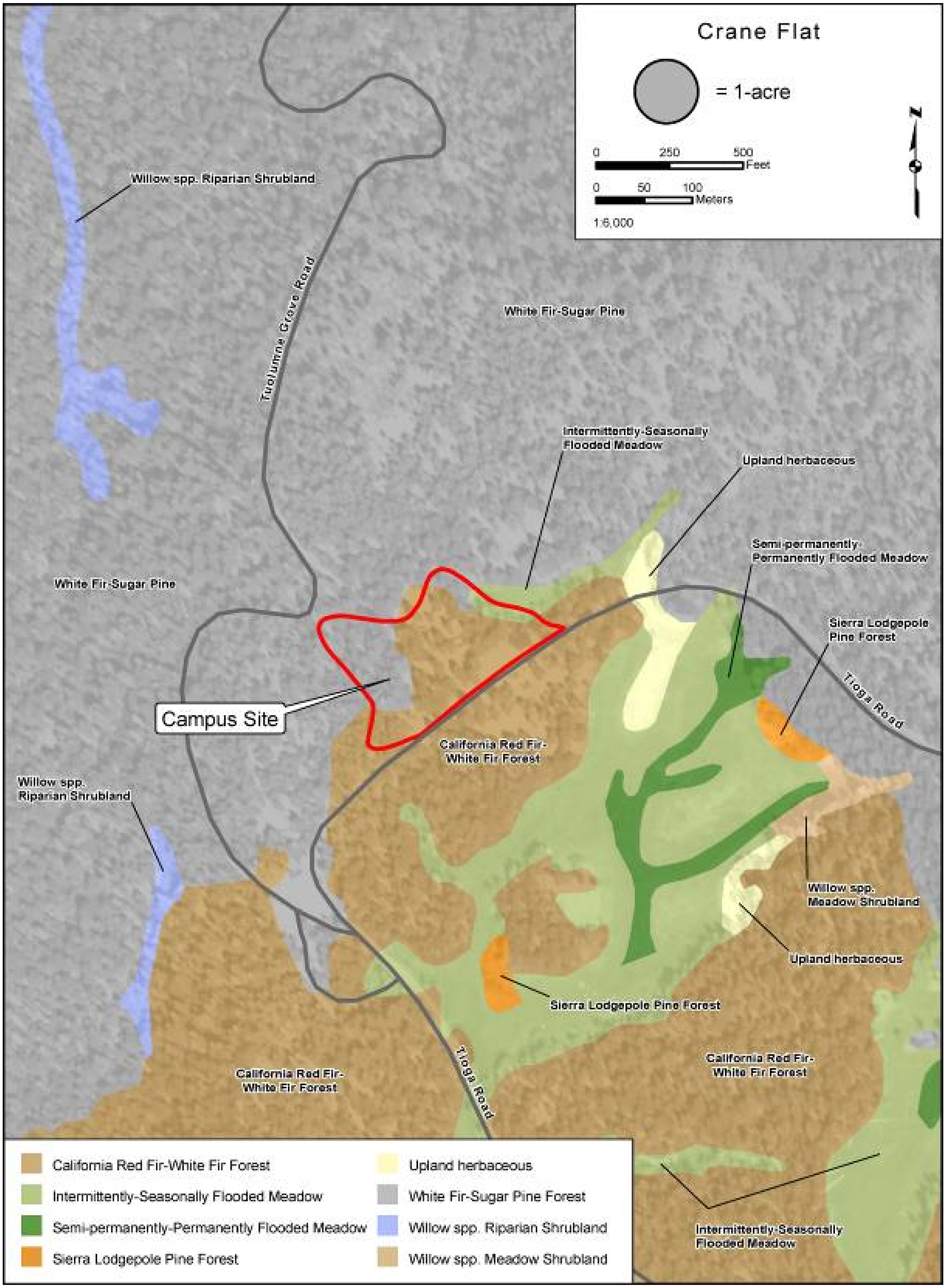

Figure 3-4. Crane Flat Vegetation

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Non- native Species. The presence and further encroachment of non- native plants within the park have resulted, and continue to result, in ecological changes. Non- native plant species occur throughout the Crane Flat area. Within the mixed conifer communities, non- native plants are not dominant. Typical non- native species in the forest communities include lamb's quarters (*Chenopodium album*), bull thistle (*Cirsium vulgare*), cultivated Timothy (*Phleum pretense*), and Kentucky bluegrass (*Poa pratensis*). Within the meadow communities, non- native species can alter the composition of meadows, out- compete native species, and reduce regional species diversity. Non- native species that are present in wetland habitat include sheep sorrel (*Rumex acetosella*) and curly dock (*R. crispus*). Control and preventive measures are in place for many non-native species.

Fire Management. The greatest departures from the natural fire return intervals within the park are clustered along the west and southwest boundaries, between the South Entrance and Crane Flat (mostly in the Merced River watershed). This area of the Park is in a management zone where fire suppression is emphasized. Unplanned ignitions that occur within this zone are suppressed using appropriate management response strategies (NPS 2004b). Crane Flat is located in the prescribed fire burn unit PW3. The National Park Service managed a controlled burn at the north end of this site to control fuel loads in 1995 (Acree and Grossenbacher 2006).

Henness Ridge Setting

Upland Vegetation. Sierra mixed coniferous forest is the primary vegetation community in the vicinity of the Henness Ridge site (Figure 3- 5). This plant community is dominated by white fir and sugar pine, with sub-dominant species including Jeffrey pine, incense- cedar, and ponderosa pine with a sparse understory layer. Other species identified at the site include hazelnut (*Corylus cornuta var. californica*), gay penstemon (*Penstemon laetus*), sierra gooseberry (*Ribes roezlii*), California black oak (*Quercus kelloggii*), and creeping snowberry (*Symphoricarpos mollis*). Although Sierra mixed coniferous forest is adapted to low- intensity, frequent fires, fire suppression efforts have resulted in a change from naturally open forest canopies to dense thickets of shade- tolerant tree species, such as incense- cedar and white fir.

Montane chaparral is present at the Henness Ridge site in small openings within the forest canopy on dry, rocky soils. Montane chaparral forms a dense, thick- leaved thicket between one and five feet tall with a typically sparse understory. Species that commonly occur within this habitat and that were observed at the site include greenleaf manzanita (*Arctostaphylos patula)*, snow bush (*Ceanothus cordulatus)*, and bush chinquapin (*Chrysolepis sempervirens)*. A rare plant, Fresno mat (*Ceanothus fresnensis)*, was observed in this habitat (Acree and Grossenbacher 2006). All of the shrub species in the montane chaparral community have adaptations that allow them to successfully regenerate following a fire. However, intense fires caused by heavy fuel loads due to fire suppression efforts can be detrimental.

Non- native Species. The Henness Ridge site is remarkably free of non- native vegetation despite a century of disturbance, including logging, a railroad, a Blister Rust camp, and historic grazing at the nearby Elevenmile Meadow. A few non- native thistles have appeared onsite following recent prescribed burns. Elevenmile Meadow also contains populations of non- native invasive species. The existing historic dirt road and trail to the meadow from the campus site could provide a pathway for the movement of invasive species onto the site. Caution should be taken to prevent inadvertent transportation of seed from these areas, or import of weeds during campus construction. Educational opportunities exist regarding invasive species control and meadow restoration.

Fire Management. The greatest departures from the natural fire return intervals resulting from fire suppression efforts within the park are clustered along the west and southwest boundaries, between the South

Entrance and Crane Flat. This area includes the Henness Ridge site. This area of the Park is in a management suppression zone. Unplanned ignitions that occur within this zone are suppressed, using appropriate management response strategies, which may include wildland fire suppression (NPS 2004b). A prescribed burn in 2006 burned through the site. The burn was of low and moderate intensity with a few high- intensity areas. Several trees appear to have significant crown damage that may result in mortality.

Environmental Consequences

Intensity Level Definitions

Impacts to native vegetation were evaluated using the process described in the introduction to this chapter. Impact threshold definitions for common vegetation are as follows:

Negligible: Native vegetation would not be affected, or effects would not be measurable.

Minor: Effects to native vegetation would be detectable. If mitigation is needed to offset adverse effects, it would be relatively simple to implement.

Moderate: Effects to native vegetation would be readily apparent. Mitigation would probably be necessary to offset adverse effects.

Major: Effects to native vegetation would be readily apparent and would substantially change the biological value of the native plant community. Extensive mitigation would probably be necessary to offset adverse effects, and its success could not be guaranteed.

Impairment

Definition

A permanent adverse change would occur to native vegetation communities in Yosemite National Park, affecting the resource to the point that the park's purposes could not be fulfilled and enjoyment by future generations of the park's vegetation would be precluded.

Impacts under Alternative 1 (No- Action Alternative)

Under the No- Action Alternative, the campus at Crane Flat would remain in its existing condition, with no new construction or change in visitor use. No construction- related impacts to vegetation would occur. Operation- related impacts would be limited to disturbance from visitor use.

Operation- related Impacts on Vegetation. Students would continue to adversely affect vegetation in the nearby white fir and giant sequoia mixed coniferous forests in areas used for educational programs. Adverse effects include trampling, soil compaction and erosion, and other use- associated impacts. Disturbance to native vegetation could create favorable conditions for the introduction of non- native plants and may discourage establishment of native vegetation. The presence of non- native species in the vicinity of Crane Flat increases the potential for native plants to be outcompeted in disturbed areas that are not properly restored. If not managed or controlled, the understory component of mixed coniferous forests around Crane Flat could become overgrown with non- native plants; however, this level of impact would require a major disturbance to result in such a dramatic change. Impacts from campus users may disturb vegetation in more heavily used areas, but a major shift in the understory component is not expected.

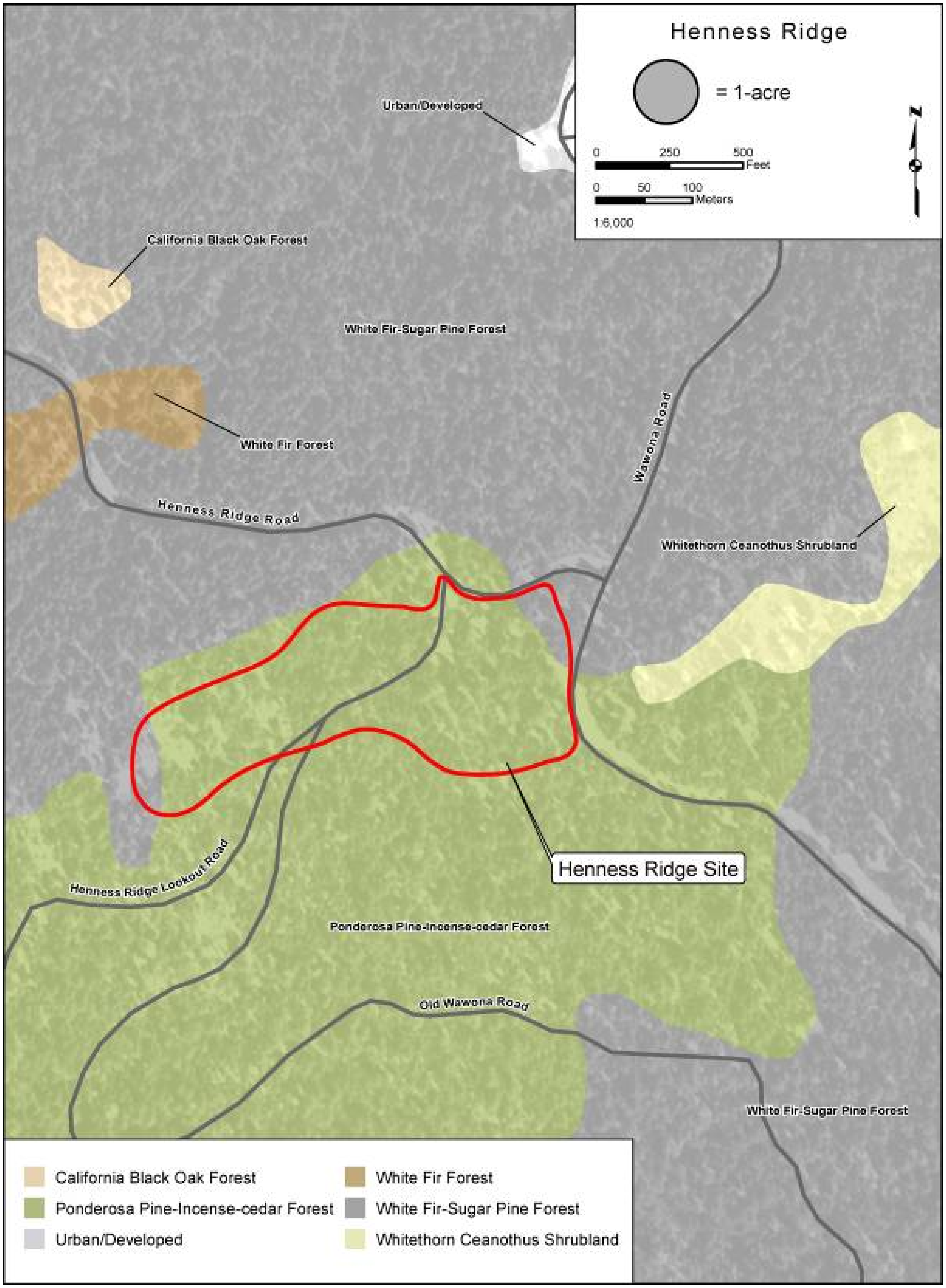

Figure 3-5. Henness Ridge Vegetation

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Impact Significance. Local, long- term, minor, adverse impact.

Conclusion. No construction- related impacts would occur. Operation- related impacts would include minor human disturbance of native vegetation.

Impairment. Though there would be continued negligible to minor adverse effects to vegetation, vegetation under this alternative would not be impaired.

Impacts under Alternative 2 (Crane Flat Redevelopment)

Under Alternative 2, the Crane Flat campus would be redeveloped, including removing existing buildings, construction new buildings in a slightly larger footprint, and expanding use of the campus (increasing visitor capacity). Construction- related impacts would include vegetation disturbance and removal for construction of new buildings. Operation- related impacts would include human disturbance of native vegetation during campus activities.

Construction- related Impacts on Vegetation. Construction activities to redevelop the campus would result in vegetation disturbance in the immediate vicinity of the existing campus and some vegetation removal to expand the campus footprint (approximately 6 acres). Effects from heavy equipment and grading activities could include soil compaction, dust, root damage, erosion, the introduction and spread of non- native species, and the removal of existing native vegetation. Although tree and other vegetation removal would result in a loss of vegetation within the Sierra mixed coniferous forest at Crane Flat, this loss would be limited to the specific sites for new buildings and paths and would not substantially fragment the existing natural plant communities, reduce species diversity, or substantially reduce the overall size or quality of the vegetation community (Table 3- 2).

Table 3-2. Estimate of Trees to be Removed for Construction of a Redeveloped Campus at Crane Flat (Alternative 2)

Tree Type	Diameter Class (in.)						
	0-10	11-20	21-30	31-40	41-50	50+	TOTAL
Fir	16	26	25	4	1	0	72
Pine	0	2	0	0	3	2	7
Oak	1	4	0	0	0	0	5
Cedar	2	2	0	0	0	0	4

Buildings have been located to avoid tree removal to the extent feasible to retain the overstory component. The redeveloped campus would be in the same general area as the existing campus, with limited expansion into undisturbed areas. Disturbed areas that are outside the development footprint would be restored following construction to allow native vegetation to re- establish and prevent the spread of non- native plants.

Impact Significance. Local, long- term, negligible, adverse impact.

Operation- related Impacts on Vegetation. Increased use of lands within the vicinity of the campus by students and other visitors could result in increased trampling or other associated effects. These effects could disturb the mixed coniferous forest communities in the area and encourage the introduction of non- native plants, as described under Alternative 1. At times, trees determined to be hazardous (for example, a tree near a building subject to imminent blowdown) to campus users would be removed.

Impact Significance. Local, long- term, minor, adverse impact.

Conclusion. Construction- related impacts would include negligible native vegetation loss and disturbance. Operation- related impacts would include minor human disturbance of native vegetation.

Impairment. Though there would be some adverse effects to vegetation, including tree removal, vegetation under this alternative would not be impaired.

Impacts under Alternative 3 (Henness Ridge Center)

Under Alternative 3, the Crane Flat Campus area would be restored to essentially natural conditions and a new campus would be developed at the generally undisturbed Henness Ridge site. This would include construction of new buildings and associated structures and moving the campus activities to the Henness Ridge area. Construction- related impacts to vegetation would include vegetation removal and disturbance. Operation- related impacts would include vegetation disturbance from increased human use of the area.

Construction- related Impacts on Vegetation. Construction activities at Henness Ridge would disturb approximately 16 acres of Sierra mixed coniferous forest and montane chaparral, mostly consisting of understory herbaceous and shrub vegetation with select tree removal. Other effects from construction equipment and activities could include soil compaction, dust, root damage, erosion, and the introduction and spread of non- native species. Vegetation removal would not substantially fragment the existing natural plant communities, reduce species diversity, or substantially reduce the overall size or quality of the vegetation at Henness Ridge because the existing roads and structures at the site have already disturbed and fragmented the communities in the vicinity. Though construction of buildings and paths would require removal of some trees (Table 3- 3), tree removal has been minimized through site design, and many of the older trees and snags would be retained for habitat. The potential for non- native species to be introduced to disturbed areas of the site is minimal because of the general lack of non- native plants in the vicinity, except at Elevenmile Meadow. Despite the amount of disturbance that would be required during construction for vegetation removal and grading, the potential for establishment of non- native species would be mitigated by equipment inspections to guarantee clean construction equipment, and post- construction weed removal activities for at least four years. Restoration activities following construction would reduce the potential for non- native plants to establish.

Table 3-3. Estimate of Trees to be Removed for Construction of a Center at Henness Ridge (Alternative 3)

Tree Type	Diameter Class (in.)						
	0-10	11-20	21-30	31-40	41-50	50+	TOTAL
Fir	35	68	7	2	0	0	112
Pine	6	12	2	9	5	8	42
Oak	0	1	0	0	0	0	1
Cedar	7	19	8	6	4	1	45

Impact Significance. Local, long- term, minor, adverse impact.

Restoration- related impacts on Vegetation. Under Alternative 3, the Crane Flat campus site would be restored to essentially natural conditions. Restoration plans would include removal of campus facilities, infrastructure, and social trails and revegetation of the area with native plants species. Restoration activities would restore site soils, topography, local native vegetation, and vegetation patterns. Restoration would also include removal and monitoring for noxious and invasive weed species.

Impact Significance. Local, long- term, major, beneficial impact.

Operation- related Impacts on Vegetation. Moving the environmental education program to the Henness Ridge area would introduce human activity and impacts to native vegetation in a generally undisturbed area. Recreation activities and daily use could result in trampling of native vegetation and other related disturbance that could degrade the mixed conifer and montane chaparral communities and increase the potential for non-native species to be introduced to the disturbed areas. New trails and use of the nearby Elevenmile Meadow, where non- native species have been identified, could provide a pathway for these species to be introduced to the Henness Ridge site. Campus activities would likely involve education on non- native species and ways to control or prevent the establishment of these species in the native communities surrounding the site. In addition, campus activities may allow students to implement measures to remove non- native plants from the nearby meadow. Campus operation at Henness Ridge could result in vegetation disturbance and introduction of non- native species, but these effects would be minimal on the native vegetation communities in the area. Trees determined to be hazardous (for example, a tree near a building subject to imminent blowdown) to campus users may need to be removed.

Impact Significance. Local, long- term, minor, adverse impact.

Conclusion. Construction- related impacts would include minor native vegetation loss and disturbance. Operation- related impacts would include negligible native vegetation disturbance.

Impairment. Though there would be some adverse effects to vegetation including tree removal, vegetation under this alternative would not be impaired.

WILDLIFE

Affected Environment

Wildlife in Yosemite National Park is diverse and abundant, reflecting the wide range of Sierra Nevada habitats. Concentrated areas of human use in the park have affected wildlife and their habitats, especially in eastern Yosemite Valley, reducing use of these areas by wildlife. Montane meadow and riparian areas within Yosemite National Park are highly productive, structurally diverse habitats that support a high level of species diversity and provide important linkages between terrestrial and aquatic communities. The long history of development and human use in Yosemite Valley has resulted in fragmentation and reduction of these habitats, affecting their quality to wildlife (NPS 2000b). In addition, the introduction of non- native species, such as wild turkey, brown- headed cowbird, bullfrogs, and several species of trout, has resulted in negative effects on native wildlife within the park (NPS 2000b).

California black oak woodland and upland habitats, such as montane hardwood, montane hardwood conifer, ponderosa pine, sierra mixed conifer woodlands, and lodgepole pine, provide roosting habitat for 10 species of bats and nesting habitat for about 130 species of birds such as acorn woodpecker (*Melanerpes* *formicivorus)*, oak titmouse (*Baeolophus inornatus)*, northern flicker (*Colaptes auratus)*, and great- horned owl (*Bubo virginianus)* (NPS 2000b). Meadow habitats within Yosemite National Park, such as fresh emergent wetland and wet meadow, support breeding Pacific chorus frogs (*Pseudacris regilla)* and western terrestrial garter snakes (*Thamnophis elegans)*. These areas provide nesting habitat for birds such as mallards (*Anas platyrhynchos)* and red- winged blackbirds (*Agelaius phoeniceus*), and provide an important source of green vegetation in summer for herbivores such as mule deer (*Odocoileus hemionus*) (NPS 2000b).

Crane Flat Setting

The association of dense montane forest habitat with large, open montane meadows provides habitat and summer forage for wildlife using the Crane Flat area. Montane meadows and associated wetland habitat support a high level of plant and wildlife species diversity and increase the habitat values of the surrounding forest by providing distinct plant communities and natural fire breaks.

Crane Flat and the surrounding area is modestly developed, with most structures limited to a few small areas in the Sierra mixed coniferous forest and mixed white fir forest. The concentration of human activities at the existing campus at Crane Flat and along the Tuolumne Grove access road has affected wildlife and their habitat, but this influence is generally limited to the immediate vicinity of developed areas, roads, and trails. Wildlife species in the vicinity of Crane Flat are generally associated with montane meadow and mixed white fir, Sierra mixed, and giant sequoia mixed coniferous forest. Though not a distinct habitat type, developed montane forest habitat at the site falls within a distinct forest/meadow ecotone and supports a handful of wildlife species that have adapted to human presence.

Wildlife species that are resident or transient to montane meadows and forests in the area include a variety of common birds, reptiles, amphibians, small and predatory mammals, and bats. Common species that have been documented at Crane Flat include the Steller's jay (*Cyanocitta stelleri*), Oregon junco (*Junco hyemalis)*, and red- breasted nuthatch (*Sitta canadensis)*, as well as the pileated woodpecker (*Dryocopus pileatus)* and Douglas squirrel (*Tamiasciurus douglasii)*. Other wildlife such as bats, least chipmunk *(Tamias minimus)*, and black bear (*Ursus americanus*) may take advantage of the added shelter or feeding opportunities associated with the existing campus development.

Although automobile- wildlife collisions are comparatively high in the Crane Flat area, measures have been successfully implemented at the existing campus to reduce human- wildlife conflicts. Improperly stored food and garbage and deliberate feeding alter the natural behavior of wildlife and lead to property damage and threats to human safety. By strictly controlling and reducing the availability of human food, the leading cause of such conflicts, incidents of property damage and other conflicts are minimized. The *Black Bear Management and Incident Summary Report* (NPS 2002a) reported that black bears caused more than $85,303 in property damage in the year 2002 during 509 separate incidents in the park. The use of bear- proof waste disposal and recycling containers and a visitor education program have kept black bear incidents to a minimum at Crane Flat.

Henness Ridge Setting

The Henness Ridge site is located in a slightly developed portion of Yosemite National Park, just east of Yosemite West. Habitats at this site with the potential to be affected include Sierran mixed conifer/ponderosa pine, Jeffrey pine, montane hardwood, and wet meadow. The area contains small, drier, rocky outcrops, with openings in the forest overstory that support montane chaparral vegetation and associated wildlife, such as reptiles and small mammals. Several mature trees present at the site provide habitat for woodpeckers, bats, and other cavity- dependent wildlife. Typical wildlife that use the habitats at Henness Ridge includes

California ground squirrel (*Spermophilus beecheyi*), black bear, mule deer, coyote, Steller's jay, western gray squirrel (*Sciurus griseus*), northern alligator lizard (*Elgaria coerulea*), and rubber boa (*Charina bottae*). The immediate vicinity of the site was previously logged and is affected by historic roads. Ongoing fire management in this wildland urban interface zone includes prescribed burns in 1998, 2005, and 2007, and thinning in 2005, which has resulted in mortality of mature conifers and reduction in ground and canopy cover. During preparation of the 2007 fire, many snags were taken, mostly from the uphill side of the Elevenmile Road. The ridge area occupies a watershed divide and is likely a migration corridor used by migrant birds and other wildlife species such as Pacific fisher moving seasonally up- or downslope.

Elevenmile Meadow is a wet meadow located approximately 1.5 miles southeast and downslope from the proposed campus; this sensitive riparian habitat is one of the most productive habitat types and plays a unique role in local wildlife. Despite a century of disturbance that included historic grazing, Elevenmile Meadow is a relatively large, intact, functioning, healthy meadow system currently devoid of trails and grazing. Although there are populations of non- native invasive plant species present, this meadow harbors a rich assemblage of grasses, sedges, and willows that support a diverse community of wildlife species, such as arthropods, small mammals, weasels (*Mustelid* spp.), black bears, great gray owls, striped racer (*Masticophis lateralis*), Pacific chorus frogs (*Hyla regilla*), and a rich diversity of meadow- dependent songbirds, including American robin (*Turdus migratorius*), orange- crowned warbler (*Vermivora celata*), Nashville warbler (*Vermivora ruficapilla*), yellow warbler (*Dendroica petechia*), Wilson's warbler (*Wilsonia pusilla*), chipping sparrow (*Spizella passerine*), and white- crowned sparrow (*Zonotrichia leucophrys*). The edge of the meadow provides an ecotone that supports a diversity of wildlife and Neotropical migratory birds.

Environmental Consequences

Intensity Level Definitions

Impacts to general wildlife were evaluated using the process described in the introduction to this chapter. Impact threshold definitions for wildlife are as follows:

Negligible: Wildlife would not be affected, or effects would not be measurable.

Minor: Effects to wildlife, such as displacement of nests or dens or obstruction of corridors, would be detectable. If mitigation is needed to offset adverse effects, it would be relatively simple to implement.

Moderate: Effects to wildlife would be readily apparent. Mitigation would probably be necessary to offset adverse effects.

Major: Effects to wildlife would be readily apparent and would substantially change the wildlife populations in the area. Extensive mitigation would probably be necessary to offset adverse effects, and its success could not be guaranteed.

Impairment

Definition

A permanent adverse change would occur in wildlife in Yosemite National Park, affecting the resource to the point that the park's purposes could not be fulfilled and enjoyment by future generations of the park's wildlife would be precluded.

Impacts under Alternative 1 (No- Action Alternative)

Under the No- Action Alternative, the environmental education campus at Crane Flat would remain in its existing state, with no new development and no increase in campus use. Necessary maintenance and repairs would continue, but no major undertakings (i.e., construction of new buildings, parking lots, pedestrian paths, and other facilities) would occur; only those ground- disturbing activities that result from continued day- to- day operations and use of the Crane Flat campus and the surrounding area would occur. No construction- related impacts to wildlife would occur. Operation- related impacts would occur from disturbance during campus use and routine maintenance.

Operation- related Impacts on Wildlife. Disturbance from human activities at the campus and routine maintenance affect wildlife using the habitats at Crane Flat or in the surrounding areas. Types of disturbance include noise, artificial light, human presence, collection, handling, automobile traffic, and other use- associated effects. Because the campus has been in existence for more than 30 years, the resident wildlife that uses the campus and nearby habitats has likely already become accustomed to human presence; thus, ongoing impacts would not be noticeable to those resident species. In addition, the campus includes measures to reduce human- wildlife conflicts, such as bear- proof waste disposal and recycling containers, to minimize impacts on wildlife.

Impact Significance. Local, long- term, negligible, adverse impact.

Conclusion. No construction- related impacts would occur. Operation- related impacts would include negligible human disturbance of wildlife.

Impairment. Though there would be some continued adverse effects to wildlife species, wildlife under this alternative would not be impaired.

Impacts under Alternative 2 (Crane Flat Redevelopment)

Under Alternative 2, the Yosemite Institute would redevelop the Crane Flat campus, including removing existing buildings, constructing new buildings, and increasing campus use by accommodating more students. Construction- related impacts would include disturbance from construction activities (demolition and construction). Operation- related impacts would include disturbance from human activities.

Construction- related Impacts on Wildlife. Demolition or removal of existing buildings and construction of new buildings and associated facilities would generate noise and ground vibrations, disturb habitat, and create other disturbances associated with human presence. Use of heavy equipment creates the potential for wildlife injuries or death, specifically for small wildlife, such as lizards and mammals that may become entrapped. Disturbance from construction activities could cause wildlife to relocate or avoid the area and could cause breeding birds to abandon their nests or avoid using the immediate area. Removal of trees or snags could affect breeding bats or birds by removing nests or roosts and could result in the harassment of adults from active nests or roosting sites located in the vicinity. Tree removal would be minimized through site design; thus, impacts to breeding bats or birds would be minimal. These impacts would be restricted to the development footprint and immediate vicinity and would be short- term, lasting only as long as construction (up to 18 months).

Impact Significance. Local, short- term, minor, adverse impact.

Operation- related Impacts on Wildlife. Increased use of the redeveloped campus would introduce more disturbances to the Crane Flat area. Resident wildlife in the area are likely already accustomed to human presence and would not likely change their habits due to a slight increase in campus use. Similar activities would occur in the same general areas; thus, impacts would be similar to those described under Alternative 1.

Impact Significance. Local, long- term, negligible, adverse impact.

Conclusion. Construction- related impacts would include minor wildlife disturbance during construction. Operation- related impacts would include negligible human disturbance of wildlife.

Impairment. Though there would be some continued adverse effects to wildlife species, wildlife under this alternative would not be impaired.

Impacts under Alternative 3 (Henness Ridge Center)

Under Alternative 3, a new campus would be developed at Henness Ridge, the Crane Flat site would be restored, and the environmental education program would be moved to the Henness Ridge area. This would introduce human activities to the Henness Ridge area, which is generally undisturbed, except for a few structures and roads. Construction- related impacts would include wildlife disturbance from construction activities. Operation- related impacts would include wildlife disturbance from human activities and a loss of habitat. The restoration of Crane Flat would include wildlife habitat restoration.

Construction- related Impacts on Wildlife. Construction of a new campus at Henness Ridge would involve heavy equipment, vegetation removal, and grading, which could disturb wildlife in the area. Similar types of impacts would occur as described under Alternative 2. Because of the minimal disturbances in the area now, construction activities could scatter local wildlife and affect breeding birds and bats during the breeding season. Tree and snag removal would be minimized through site design; however, several trees would need to be removed to accommodate the development, which would affect birds or bats using the trees. Impacts would be most noticeable at the initial stages of construction when the wildlife are not accustomed to the disturbance; however, over a period of time, the wildlife that use the area would likely relocate to less disturbed areas nearby. Common wildlife that are more tolerant of human presence, such as ravens, squirrels, and black bears, may continue to use the general area during the disturbance. Wildlife disturbance from construction activities would be limited to the construction phase, but could affect the local wildlife in the Henness Ridge area by causing them to relocate or alter their habits during this period.

Impact Significance. Local, short- term, moderate, adverse impact.

Restoration- related Impacts on Wildlife. The restoration of Crane Flat would include restoring the campus site to natural conditions, which would help preserve the unique natural features and potentially increase biodiversity of wildlife species using the site. Regionally, within the Sierra Nevada, large montane meadows are increasingly rare due to development, and fens are even more unique and sensitive. These ecotones provide highly valuable nesting and foraging habitat for wildlife species. Restoration of Crane Flat would include restoring and enhancing habitat for wildlife species, restoring native vegetation, and hydrologic function. Social trails and other campus areas would be revegetated with native plants. Remaining trails would be minimal and a split- rail fence would be constructed adjacent to the meadow to restrict meadow access. Mitigation measures already in place to protect resources and minimize impacts to sensitive species and habitats, such as reducing noise and light pollution would continue.

Impact Significance. Local, short- term, moderate, adverse impact. Local, long- term, moderate, beneficial impact.

Operation-related Impacts on Wildlife. Campus activities in the vicinity of Henness Ridge would introduce human disturbance to an area that is not frequently used by visitors. Wildlife in this area may somewhat be accustomed to human disturbance due to the close proximity of recreation areas and Yosemite West. However, the education program would include activities that produce noise, which would disturb local wildlife, particularly breeding birds and night-dwelling animals. New trails used by the campus would fragment habitat and introduce invasive species. In general, the presence of humans lowers the value of habitat for native wildlife, and through the introduction of unnatural food sources has the potential to affect behavior, distribution and abundance of wildlife species (Boyle and Samson 1985). The development would also result in a loss of approximately 16 acres of mixed coniferous forest and montane chaparral although trees and snags would be retained to the extent feasible to maintain the overstory habitat. These changes to the Henness Ridge area would affect the local wildlife populations by causing them to relocate to more suitable, less disturbed habitat or find new nesting areas, which could affect reproductive success for a short period after the campus is established. The ridge area is located within walking distance (10-15 minutes) from the proposed development site and the wildlife species that use the ridge as a migration corridor would likely be affected by daily campus activities, such as the daily and sunset hikes. The sensitive riparian habitats located at Elevenmile Meadow provide unique learning opportunities and are possible destinations for campus activities; however, the wildlife dependent on this sensitive meadow habitat would be disturbed by the presence of humans.

Impact Significance. Local, long-term, moderate, adverse impact.

Conclusion. Construction-related impacts would include moderate wildlife disturbance. Restoration-related impacts would include habitat restoration with moderate benefits to wildlife. Operation-related impacts would include moderate wildlife disturbance and habitat loss.

Impairment. Though there would be some adverse effects to wildlife species, wildlife under this alternative would not be impaired.

RARE, THREATENED, AND ENDANGERED SPECIES

Affected Environment

The Sierra Nevada contains 33 bird species, 19 mammals, 13 amphibians, and four reptiles considered at risk and afforded special status (i.e., through listing as endangered, threatened, or of special concern by the state or federal government), which is roughly 17% of the Sierra Nevada terrestrial fauna (UC Davis 1996). At least three species have been extirpated from the mountain range since the time of Euro-American settlement: Bell's vireo (*Vireo bellii)*, California condor (*Gymnogyps californianus)*, and grizzly bear (*Ursus arctos)*. Population declines can be attributed to several factors in varying proportions, including habitat loss, disturbance or hunting by humans, environmental toxins, climatic change, and competition from non-native species. However, two of the most charismatic species associated with the park, the bald eagle (*Haliaeetus leucocephalus)* and the peregrine falcon (*Falco peregrinus anatum)*, are showing signs of recovery. The bald eagle was formerly delisted on August 8, 2007; the peregrine falcon was formally delisted on August 25, 1999.

The Sierra Nevada is also rich in plant diversity. Of California's 7,000 plant species, about 50% occur in the Sierra Nevada. Of these, more than 400 are found *only* in the Sierra Nevada, and 200 are rare. As a group, Sierra Nevada plants are most at risk where habitat has been reduced or altered, or where restricted to rare local geologic formations and their derived unique soils.

Critical Habitat. Section 7 of the Endangered Species Act (ESA) requires federal agencies to ensure that any action authorized, funded or carried out by them is not likely to jeopardize the continued existence of listed species or modify their critical habitat. Critical habitat is defined as specific geographic areas, whether occupied by listed species or not, that are determined to be essential for the conservation and management of listed species and that have been formally described in the Federal Register. There are no federally listed species with potential to occur in either project area. There are also no designated critical habitat areas for federally listed species that include either project area. Thus, the project is not subject to consultation or further consideration of critical habitat issues.

Unit 5 of the originally proposed critical habitat for the California red-legged frog (*Rana aurora draytonii*) is near the border of Crane Flat project site. Critical habitat for the frog was designated by the U.S. Fish and Wildlife Service (USFWS) on March 13, 2001 (USFWS 2001). In July 2002, a federal judge repealed the ruling over 4.0 million acres of habitat; which initially retained the Yosemite Unit (Unit 5); however, the proposed revised critical habitat for this species (USFWS 2005) does not include Unit 5. Unit 5 consists of drainages found in the tributaries of the Tuolumne River and Jordan Creek, a tributary to the Merced River, in Tuolumne and Mariposa Counties. The environmental education campus at Crane Flat is located near the edge of the defined critical habitat boundary for Unit 5. In accordance with section 3(5)(A)(I) of the ESA, critical habitat includes only those areas that possess physical and biological features (primary constituent elements) that are essential to the conservation of the species, and that may require special management considerations and protection (e.g., breeding habitat). As these elements are absent from the local vicinity of the campus at Crane Flat, this area is not considered critical habitat as described in the final 2001 ruling.

Special-status Species Considered. A list of special-status species was generated based on data gathered from the National Park Service, USFWS (USFWS 2008), and the California Department of Fish and Game (CDFG) California Natural Diversity Database, which is part of the 50-state Natural Heritage Network (CDFG 2009). This list included species that are listed as threatened or endangered under the federal or California ESAs, that are candidates or proposed for listing, that are afforded special protection by the state of California (i.e., species of special concern or fully protected) or by the National Park Service (i.e., rare plants), or that are otherwise considered a special-status species based on input from the NPS Yosemite Wildlife or Vegetation Management Branch. It was determined that because there are no federally listed species present at the project locations, that subsequent consultation of impact determination with USFWS is not required.

Each species was evaluated to determine its potential to occur at either Crane Flat or Henness Ridge and be affected by the alternatives (see Appendix D, Table D-1). This evaluation considered the distribution and abundance of each species, habitat requirements of each species, habitat characteristics of each site, and existing human disturbance at each site. Species with potential to occur at either site are listed in Table 3-4 and are described briefly in the following pages. Appendix D contains full species accounts of all special-status species with the potential to be affected by the alternatives.

A total of 42 special-status wildlife species and 15 special-status plant species were considered in the evaluation of the Crane Flat and Henness Ridge project sites (see Appendix D). These special-status species include those listed as endangered, threatened, proposed, or candidate under the Federal Endangered Species Act of 1973, as amended (USFWS 2008), species listed as endangered, threatened, candidate, or sensitive under the California Endangered Species Act or accorded "special status" (i.e., considered rare or sensitive by the California Department of Fish and Game), and park sensitive wildlife species and park rare plants.

Each species in was evaluated to determine (1) the known or likely occurrence of a species or its preferred habitat in the vicinity of the project area, and the possibility of a species or its preferred habitat types occurring in areas expected to be affected; (2) the direct physical loss of habitat; (3) the loss of habitat from its modification; and (4) the effective loss of habitat due to construction activity, noise, trampling, or other types of direct and indirect effects. Habitat fragmentation was also considered.

As a result of the preliminary assessment, including an analysis of distribution and abundance, habitat requirements of each species, and habitat characteristics of each project site, and existing human disturbance issues of each project site, it was determined that 35 of the 57 special- status species warranted further consideration in the body of this environmental impact statement (Table 3- 4). The remaining 22 special-status species do not occur in the project area, and there would be no direct, indirect, or cumulative effects on these species from actions proposed in the alternatives (see Appendix D). These species are not evaluated further in this environmental impact statement.

Table 3-4. Special-status Species Evaluated in the EIS

Species Name	Status	Habitat Preference	Crane Flat	Henness Ridge
Plants				
Yosemite Rock Cress (*Arabis repanda* var. *repanda*)	PS	Dry forests in mixed conifer, montane, and subalpine zones	X	
Fresno Mat (Ceanothus fresnensis)	PS	Montane chaparral		X
Mt. Lady's Slipper (Cypripedium montanum Douglas ex Lindley)	CWL	Northern slopes in mixed conifer mixed conifer/oak woodland		X*
Bolander's Dandelion (*Phalacroseris breweri*)	PS	Meadows	X	
Whitneya (Whitneya dealbata)	PS	Forests	X	
Amphibian				
Yosemite Toad (*Bufo canorus*)	FC, CSC	Wet meadow	Suitable Habitat	Suitable Habitat*
Birds				
Northern Goshawk (*Accipiter gentilis*)	CSC	Coniferous forests	X	X
Cooper's Hawk (Accipiter cooperii)	CWL	Woodlands and forests	X	X
Sharp-shinned Hawk Accipiter striatus	CWL	Woodlands and forests	X	X
Golden Eagle (Aquila chrysaetos)	CFP, CWL, BCC	Forests near open terrain	X	X

Table 3-4. Special-status Species Evaluated in the EIS

Species Name	Status	Habitat Preference	Crane Flat	Henness Ridge
Long-eared Owl (*Asio otus*)	CSC	Riparian and live oak woodlands and thickets	X	X
Flammulated Owl (*Otus flammeolus*)	BCC	Coniferous forests	X	X
Great Gray Owl (*Strix nebulosa*)	CE	Mixed conifer and other conifer forest types, wet meadow	X	Suitable Habitat*
California Spotted Owl (S. occidentalis occidentalis)	BCC, CSC	Late-stage oak and ponderosa pine forests	X	X
Vaux's Swift (*Chaetura vauxi*)	CSC	Mixed coniferous forest	X	Suitable Habitat
White-headed woodpecker (Picoides albolarvatus)	BCC	Mixed-montane coniferous forest with relatively open canopy and availability of snags and stumps	X	X
Olive-sided Flycatcher (*Contopus cooperi*)	BCC, CSC	Coniferous forest	X	X
Willow Flycatcher (*Empidonax traillii*)	CE	Mountain meadows and riparian areas	X	Suitable Habitat*
Hermit Warbler (Dendroica occidentalis)	ABC:WL	Coniferous forest	X	X
Yellow Warbler (*Dendroica petechia*)	BCC, CSC	Riparian woodlands, mixed conifer and other coniferous forest habitats	X	X*
Mammals				
Pallid Bat (Antrozous pallidus)	CSC	Oak, ponderosa pine, and giant sequoia habitats	X	Suitable Habitat
Townsend's Big-eared Bat (Corynorhinus townsendii townsendii)	CSC	All habitats	Suitable Habitat	Suitable Habitat
Spotted Bat (Euderma maculatum)	CSC	Variety of habitats, crevices	X	Suitable Habitat
Silver-haired Bat (Lasionycteris noctivagans)	WBWG:M	mixed conifer/hardwood forests with available water	Suitable Habitat	Suitable Habitat
Western Red Bat (Lasiurus blossevillii)	CSC	All habitats	Suitable Habitat	Suitable Habitat
Hoary Bat (Lasiurus blossevillii)	WBWG:M	Cottonwood riparian habitat and forested areas	Suitable Habitat	Suitable Habitat

Table 3-4. Special-status Species Evaluated in the EIS

Species Name	Status	Habitat Preference	Crane Flat	Henness Ridge
Western Small-footed Myotis (*Myotis ciliolabrum*)	BLM:S, WBWG:M	Wooded and brushy habitats near water	Suitable Habitat	Suitable Habitat
Long-eared Myotis (*Myotis evotis*)	BLM:S, WBWG:M	Montane oak woodlands and coniferous habitats	Suitable Habitat	Suitable Habitat
Fringed Myotis (*Myotis thysanodes*)	BLM:S, WBWG:H	Deciduous/mixed conifer forests	Suitable Habitat	Suitable Habitat
Long-legged Myotis (*Myotis volans*)	WBWG:H	Montane coniferous forest habitats	Suitable Habitat	Suitable Habitat
Yuma Myotis (Myotis yumanensis)	BLM:S	Meadows, near water, caves, crevices	Suitable Habitat	Suitable Habitat
Western Mastiff Bat (Eumops perotis californicus)	CSC	Desert scrub and chaparral to montane coniferous forest	Suitable Habitat	Suitable Habitat
Sierra Nevada Mountain Beaver (*Aplodontia rufa californica*)	CSC	Moist meadows and montane riparian habitat	X	X
American Marten (*Martes americana*)	USFS:S	Dense, complex coniferous forests	X	X
Pacific Fisher (*Martes pennanti*)	FC, CC	Mature coniferous forests and deciduous-riparian habitats	X	X

Notes: PS=Yosemite National Park Sensitive Plant; FC=Federal Candidate; USFS:S=U.S. Forest Service Sensitive; BLM:S=Bureau of Land Management Sensitive; CE=California Endangered; CSC=California Species of Special Concern; CFP=California Fully Protected; CWL=California Watch List; BCC=Federal Bird of Conservation Concern; ABC:WL=American Bird Conservancy: U.S. Watchlist of Birds of Conservation Concern; WBWG:H/M=Western Bat Working Group High/Medium Priority
* Suitable Habitat at Elevenmile Meadow
Documented occurrences within the vicinity of Crane Flat or Henness Ridge are indicated with an "X" in the appropriate column.

Special- status Plants Overview. Five special- status plants have been identified or have potential to occur at either Crane Flat or Henness Ridge. Information on known populations of each species and their potential to occur at each site is provided below in the settings for Crane Flat and Henness Ridge. Habitat preferences for each species are described in Table 3- 4, and full species accounts are included in Appendix D.

Special- status Wildlife Species Overview. One amphibian, 14 birds, and 15 mammals with special status have potential to occur at Crane Flat or Henness Ridge. Full species accounts are provided in Appendix D. Status and habitat preferences are identified in Table 3- 4. A discussion of suitable habitat or known populations of these species at each site is provided in the Crane Flat and Henness Ridge settings.

Crane Flat Setting

Based on the habitat characteristics of Crane Flat and surveys of the area, the following special- status plant and wildlife species have potential or are known to occur. See Appendix D for detailed species accounts and Table 3- 1 for status and habitat preference.

Special- status Plants

Yosemite Rock Cress. This park- sensitive species is poorly documented in Yosemite. A population of about 1,550 plants, mostly seedlings, has been mapped adjacent to the campus (Acree and Grossenbacher 2006).

Bolander's Dandelion. This park- sensitive plant is endemic to the central and southern Sierra Nevada. In Yosemite National Park, this plant is known from meadows on the Glacier Point Road, Crane Flat, and Tamarack Flat. A population of about 140 individuals has been mapped across the street from the Crane Flat campus (Acree and Grossenbacher 2006).

Whitneya. This park- sensitive plant is endemic to Sierra Nevada with a limited distribution in Yosemite National Park and California. While there are no occurrences of this species at the Crane Flat campus, a population of about 1,600 individuals has been mapped across the street from the campus (Acree and Grossenbacher 2006).

Special- status Wildlife

Yosemite Toad. Yosemite toads inhabit high elevation wet meadows in the central high Sierra Nevada. Research suggests that populations have declined in and around Yosemite National Park. Currently there are no presence/absence data for Yosemite toad at Crane Flat. Although the campus is located at or below Yosemite toads' lower elevation range, the wet meadow habitat near Crane Flat may provide suitable habitat for the toad.

Northern Goshawk. Northern goshawks have been observed on 155 different occasions in Yosemite National Park, including five records in the Crane Flat vicinity (1976, 1982, 1992, and 1993) (Yosemite Wildlife Observation Database 2009). Key breeding requirements, including suitable nesting and foraging habitat, and adequate prey, probably exist at Crane Flat.

Cooper's Hawk. The Cooper's hawk is a medium- sized accipiter found throughout the Sierra Nevada from the foothills to approximately 9,000 feet above msl in elevation and has been known to occur at Crane Flat.

Sharp- shinned Hawk. Crane Flat contains suitable nesting and foraging habitat for sharp- shinned hawks. (Gaines 1992) noted nesting behavior on the west slope of Crane Flat at 6230 feet above msl in elevation. Sharp- shinned hawks have been observed on 33 different occasions in Yosemite, including three records in the Crane Flat vicinity (1978, 1990, and 1994) (Yosemite Wildlife Observation Database 2009).

Golden Eagle. The relatively intact habitats in Yosemite are beneficial to golden eagles, and recent large fires in the park have likely expanded the area of suitable foraging habitat by providing more open terrain. Golden eagles have been observed on 262 different occasions in Yosemite, including two records in the Crane Flat vicinity (Yosemite Wildlife Observation Database 2009). Although Crane Flat probably does not contain suitable nesting structures for golden eagles, the site is within the home range of breeding pairs and contains large snags, valued as hunting perches.

Long- eared Owl. In Yosemite National Park, little is known about the status of the long- eared owl. They have been observed on 22 different occasions, including two records at Crane Flat in October 1982 and June

1986. Virtually nothing is known of their population status, habitat requirements, and prey in the park (Gaines 1992) and known nesting locations in the park are few, but include one in Yosemite Valley in 1915. Crane Flat appears to contain suitable nesting and foraging habitat for long- eared owls.

Flammulated Owl. This small forest owl is considered a common summer resident locally (Winter 1974, Garrett and Dunn 1981), but vulnerable and possibly declining in some areas. It is generally found in coniferous habitats with low to intermediate canopy closure. The species breeds May through October; peak breeding season occurs in June and July. Territory size is seldom more than 900 feet in diameter, and varies from 4 to 10 acres. Flammulated owls are one of the least studied and least understood birds in Yosemite National Park. Very little information exists on the breeding status of flammulated owls and their habitat requirements. However, breeding habitat appears to be present at Crane Flat. One observation was near Crane Flat at the Merced Grove on July 7, 1925.

Great Gray Owl. In California, great gray owls are restricted to the Sierra Nevada and southern Cascades. The core breeding distribution is centered on Yosemite National Park and the immediately adjacent and surrounding areas. The great gray owl is apparently a habitat specialist in the Yosemite region that requires functioning wet montane meadow habitat for foraging adjacent to forest stands with high canopy closure and a significant component consisting of large, standing snags for nesting and successful reproduction, along with suitable wintering foraging habitat during the non- breeding period. In the Sierra Nevada during the breeding season, there are approximately 50 meadows used by great gray owls, including about 35 in Yosemite National Park that have been used in the last 20 years (Maurer 2006).

Great gray owls have been observed at the Crane Flat Meadow complex almost every year since 1970 and every year since 1979 to 2008, although reproduction has not been documented in Crane Flat since 1994 (survey efforts since that time have been limited to three times in a decade). At Crane Flat, several visitor and employee facilities, developments, and activities as well as park projects exist that likely influence owl behavior and habitat use patterns (Maurer 2006). In addition, owls in this area are also at high risk of auto collision, a significant source of mortality among adult great gray owls. In 2003, two great gray owls were hit by vehicles at Crane Flat (Maurer 2006).

Human activity and development in and adjacent to park meadows can disrupt great gray owl foraging behavior, which may reduce foraging success and compromise breeding success. Wildman (1992) reported that in 1987- 1988, visitors were present in meadows at Crane Flat at the same time as an owl from 5% to 10% of the time and flushed owls about 25% of the time. When flushed by visitors, owls typically flew into the forest, and did not return to the meadow 57% of the time to resume hunting; those that returned did so about 50 minutes after human activity had ceased. Birdwatchers caused 50% more flushes than non- birdwatchers. Because owls detect prey primarily by sound, noise pollution may decrease foraging success, provisioning young, and successful breeding (Maurer 2006).

California Spotted Owl. The California spotted owl ranges from the southern Cascades south throughout the entire Sierra Nevada, and in the central Coast Ranges. Population density in Yosemite is higher than elsewhere in the Sierra Nevada. Between 1940 and 2007, casual observers have reported 69 observations of California spotted owls in Yosemite National Park (Yosemite Wildlife Observation Database 2008), including nine in the Crane Flat area.

A spotted owl nest is located in the near vicinity of the Crane Flat project area, and a female spotted owl was detected in 2007 during a great gray owl survey (Keane et al. 2008). Sierra mixed coniferous forest is the most common vegetation community in the vicinity of Crane Flat (Acree and Grossenbacher 2006), and it provides suitable roosting, nesting, and foraging habitat for the spotted owl.

Vaux's Swift. In Yosemite National Park, Vaux's swifts are probably widely distributed in old- growth forests where standing, hollow snags afford suitable nesting sites.The Vaux's swift inhabits the Crane Flat area, which contains suitable nesting habitat. Out of 21 parkwide observations, Vaux's swifts have been observed at Crane Flat on six different occasions (Yosemite Wildlife Observation Database 2008). A nesting pair was observed entering a dead red fir snag at Crane Flat in 1968 (Gaines 1992). Peak counts include 20 to 30 individuals detected at Crane Flat from July 15 to 21, 1985.

White- headed woodpecker. The white- headed woodpecker is present at Crane Flat project sites, where suitable roosting, nesting, and foraging habitat exist. The Yosemite Wildlife Observation Database (2009) contains seven records from Crane Flat. In June 2003, at the Crane Flat Campground, an observer watched an adult white- headed woodpecker carry food into a nest cavity (Yosemite Wildlife Observation Database 2009). The species is relatively tolerant of human activity in nest vicinity, so long as the nest itself is not disturbed (Garrett et al. 1996).

Olive- sided Flycatcher. The olive- sided flycatcher inhabits the Crane Flat area. The Crane Flat site appears to contain suitable nesting habitat. Olive sided- flycatchers have been observed six times at Crane Flat (Yosemite Wildlife Observation Database 2008).

Willow Flycatcher. Evidence suggests willow flycatchers have nested in Crane Flat within the last 20 years. From 1990 to present, six willow flycatchers have been captured and banded at Crane Flat during Monitoring Avian Productivity and Survivorship (MAPS) standard operations. In 1994, one individual was identified as a female with a mature brood patch, suggesting she was brooding young locally at Crane Flat.

Hermit Warbler. Hermit warbler is a common breeding species at Crane Flat, evidenced by 633 individual captures by the Crane Flat MAPS station between 1990 and 2006.

Yellow Warbler. Yellow warblers inhabit and probably breed within the Crane Flat area. Between 1990 and 2006, MAPS operations collected data on 21 individuals, including individuals in breeding condition.

Pallid Bat. The pallid bat has been detected at Crane Flat, as the site contains suitable habitat. The detection at Crane Flat occurred in July 2004 and consisted of a lactating female pallid bat in the vicinity of the campground (Pierson et al. 2006).

Townsend's Big- eared Bat. Although no surveys have been conducted at Crane Flat, suitable habitat exists and the occurrence of this species is likely.

Spotted Bat. Spotted bats have been detected in proximity to Crane Flat, at the Tuolumne Grove (Pierson et al. 2006). However, because this species is thought to be an obligate cliff- dweller, and is known to travel large distances from its roost sites to forage, it is highly unlikely that it would be found roosting in the project area. However, the spotted bat probably forages in or near Crane Flat.

Silver- haired Bat. No surveys for silver- haired bats have been conducted at Crane Flat; however, suitable habitat exists for their occurrence. The species has been documented near the Crane Flat project area at the Tuolumne Grove in February 1993 (Yosemite Wildlife Observation Database 2009) and at the Merced Grove (Pierson et al. 2006).

Western Red Bat. No surveys for western red bats have been conducted at Crane Flat; however, suitable habitat exists for their occurrence.

Hoary Bat. No surveys for hoary bat have been conducted at Crane Flat; however, suitable non- breeding habitat exists for their occurrence. Hoary bats have been documented in the Tuolumne Grove, located adjacent to the Crane Flat project area.

Western Small- footed Myotis Bat. Roosting habitat for this species potentially occurs in forested habitats surrounding Crane Flat. Focused bat surveys have not been performed to verify the presence or absence of this species in the local vicinity; thus, they are presumed present based on the availability of suitable habitat. Surveys of site structures completed in summer 2002 revealed no evidence of bat use of structures associated with the Crane Flat campus. While not a common feature in the project area, rock crevices may provide suitable roosting habitat.

Long- eared Myotis Bat. Roosting habitat for this species potentially occurs in forested habitats surrounding Crane Flat. Focused bat surveys have not been performed to verify the presence or absence of this species in the local vicinity; thus, they are presumed present based on the availability of suitable habitat. Surveys of site structures completed in summer 2002 revealed no evidence of bat use of structures associated with the Crane Flat campus. Snags or other trees in the vicinity of Crane Flat provide suitable habitat for this species.

Fringed Myotis Bat. Roosting habitat for this species potentially occurs in forested habitats surrounding Crane Flat. There is a museum record of this species from 1951 (Pierson et al. 2006). Focused bat surveys have not been performed to verify the presence or absence of this species in the local vicinity; thus, they are presumed present based on the availability of suitable habitat. Surveys of site structures completed in summer 2002 revealed no evidence of bat use of structures associated with the Crane Flat campus. Snags or other trees in the vicinity of Crane Flat provide suitable habitat for this species.

Long- legged Myotis Bat. Roosting habitat for this species potentially occurs in forested habitats surrounding Crane Flat. Focused bat surveys have not been performed to verify the presence or absence of this species in the local vicinity; thus, they are presumed present based on the availability of suitable habitat. Surveys of site structures completed in summer 2002 revealed no evidence of bat use of structures associated with the Crane Flat campus. Snags or other trees in the vicinity of Crane Flat provide suitable habitat for this species.

Yuma Myotis Bat. Roosting habitat for this species potentially occurs in forested habitats surrounding Crane Flat. Focused bat surveys have not been performed to verify the presence or absence of this species in the local vicinity; thus, they are presumed present based on the availability of suitable habitat. Surveys of site structures completed in summer 2002 revealed no evidence of bat use of structures associated with the Crane Flat campus. Snags or other trees in the vicinity of Crane Flat provide suitable habitat for this species.

Western Mastiff Bat. The greater western mastiff bat most likely forages in or near Crane Flat. No surveys have been conducted at Crane Flat; however, suitable habitat exists.

Sierra Nevada Mountain Beaver. Mountain beavers have been observed in the Crane Flat vicinity, including Merced Grove in June 1981 and along the Big Oak Flat Road in May 1981

American Marten. An American marten observation was recorded in October of 1946 at Crane Flat, and two observations (1992 and 1996) have been recorded since then in the near vicinity along the Big Oak Flat Road.

Pacific Fisher. Fisher tracks have been observed at Crane Flat, which contains habitat features required by fishers for resting, denning, and dispersing. Fishers are highly elusive, fast, nocturnal animals, making it difficult to determine their status in Yosemite, much less in the project area. There have been several fisher sightings and road kills in Yosemite; however, none of the known natal and maternal dens in the Sierra

Nevada are located in Yosemite. Location of den sites is difficult and time- consuming, and project- level surveys are unlikely to locate new den sites. Depending on the detection method, it can take up to 21 days to confirm or deny the presence of fishers in an area (Zielinski et al. 1996). In the past decade, there have been five road kills and about 15 unverified sightings of fisher, the majority of which have occurred along the Wawona and Big Oak Flat Roads near Henness Ridge and Crane Flat.

Henness Ridge Setting

Based on the habitat characteristics at Henness Ridge and surveys of the area, the following special- status plant and wildlife species have potential or are known to occur:

Special- status Plants

Fresno Mat. Fresno mat is endemic to central Sierra Nevada coniferous forest, and locally common in the vicinity of Chinquapin. A small population has been identified at the Henness Ridge site (Acree and Grossenbacher 2006).

Mt. Lady Slipper Orchid. Mt. Lady Slipper orchids are known to occur nearby.

Special- status Wildlife

Yosemite Toad. Past research indicates that meadows along the Glacier Point Road support Yosemite toad. In 1997, Fellers (1997) detected two adults at Westfall Meadow. Currently, there are no presence/absence data on Yosemite toad at the Henness Ridge site, but nearby meadows (e.g., Elevenmile Meadow) may provide suitable habitat.

Northern Goshawk. Northern goshawks have been observed on 155 different occasions in Yosemite National Park, including four records in the Henness Ridge vicinity (1980, 1982, 1993, and 1994) (Yosemite Wildlife Observation Database 2008). Key breeding requirements, including suitable nesting and foraging habitat and adequate prey, probably exist in the project area.

Cooper's Hawk. The Henness Ridge site supports habitat suitable for Cooper's hawk nesting. NPS (2007) survey results indicated that a Cooper's hawk was detected in the vicinity of Henness Ridge in 2006.

Sharp- shinned Hawk. Henness Ridge contains suitable nesting and foraging habitat for sharp- shinned hawks. Sharp- shinned hawks have been observed on 33 different occasions in Yosemite, including two records in the Henness Ridge vicinity (1984 and 2006) (Yosemite Wildlife Observation Database 2009). The detection at Henness Ridge was during a site visit conducted by a Yosemite NPS biologist on 6 September 2006.

Golden Eagle. Although Henness Ridge probably does not contain suitable nesting structures, the project area is within the home range of breeding pairs and contains large snags, valued as hunting perches. In 2008, an NPS employee observed a golden eagle perched on one of the larger snags at Henness Ridge during a site visit (Ann Roberts, personal communication, April 2009). Golden eagles have been observed on 262 different occasions in Yosemite, including 11 records in the Henness vicinity (Yosemite Wildlife Observation Database 2009).

Long- eared Owl. Little is known about the status of the long- eared owl in the park; however, Henness Ridge appears to contain suitable nesting and foraging habitat. Long- eared owls have been observed on 22 different occasions in Yosemite National Park, including a pair observed at Henness Ridge (Gaines 1992), and nine records from Glacier Point Road (Yosemite Wildlife Observation Database 2009).

Flammulated Owl. Flammulated owls are one of the least studied and least understood birds in Yosemite National Park. Very little information exists on the breeding status of flammulated owls and their habitat requirements. However, the biggest density of flammulated owls in the park has been observed at Henness Ridge. Based on anecdotal observations, a breeding colony has inhabited Henness Ridge for decades. Between 1962 and 2007, 12 of 27 parkwide observations have been from the Henness area (NPS 2007).

Great Gray Owl. The great gray owl requires functioning wet montane meadow habitat for foraging adjacent to forest stands with high canopy closure and a significant component consisting of large, standing snags for nesting and successful reproduction, along with suitable wintering foraging habitat during the non- breeding period. The Henness Ridge project area contains critical habitat for great gray owls in Yosemite. Although the proposed campus location at Henness Ridge is unlikely to receive more than incidental use by great gray owl because of the distance to the nearest suitable meadow complex, great gray owls have been documented at the Elevenmile Meadow approximately 1 mile south of Henness Ridge (NPS 2007). Elevenmile Meadow has not been regularly surveyed for owls, and thus great gray owl observations are limited to 1993 by the NPS forestry crew and during surveys by great gray owl researchers during winters of 1987 through 1990, in fall 2007, and spring 2008. Elevenmile Meadow appears to be used by great gray owls occasionally during the breeding season and regularly during the winter.

California Spotted Owl. The Henness Ridge project area provides suitable roosting, nesting, and foraging habitat for the California spotted owl. Between 1940 and 2007, casual observers have reported 69 observations of California spotted owls in Yosemite National Park (Yosemite Wildlife Observation Database 2008), including 10 in the Henness Ridge area. At Henness Ridge, a pair of spotted owls was confirmed and a nest site was located in 1988 (Gould and Norton 1993). Since then, spotted owls have continued to use the Henness Ridge area for nesting (Roberts 2008). At nearby Elevenmile Meadow, spotted owls were detected on June 11, 2007, and August 7, 2007, during great gray owl surveys (Keane et al. 2008), and were subsequently detected in summer 2008 (Keane, unpublished data). Spotted owls were confirmed at other nearby locations accessed from the Glacier Point Road, including Monroe Meadow (near Badger Pass), McGurk Meadow, and Dewey Point (Gould and Norton 1993; Roberts 2008).

Vaux's Swift. The Vaux's swift probably inhabits the Henness Ridge area, as the area appears to contain suitable nesting habitat. The lack of observations of this species at Henness Ridge probably reflects fewer people reporting wildlife observations in that part of the park, rather than absence of the animal. Gaines (1992) suspects that the population is widely distributed in old- growth forests where standing, hollow snags afford suitable nesting cavities.

White- headed Woodpecker. The white- headed woodpecker is present at the Henness Ridge project site, which contains suitable roosting, nesting, and foraging habitat. The Yosemite Wildlife Observation Database (2009) only contains one record of this species at Henness Ridge; however, white- headed woodpeckers have been seen regularly during site visits in 2006 and 2007, and were detected during bird surveys in summer 2007 (NPS 2007).

Olive- sided Flycatcher. The olive- sided flycatcher inhabits the Henness Ridge area because the site appears to contain suitable nesting habitat. This species was documented by Museum of Vertebrate Zoology on June 12, 1915, noted on May 19, 1919, in the Yosemite Wildlife Observation Database, and detected during breeding bird point count surveys at Henness Ridge (NPS 2007).

Willow Flycatcher. The nearby Elevenmile Meadow provides suitable habitat for willow flycatchers, but its presence there is purely speculative at this point.

Hermit Warbler. Hermit warblers occur at the Henness Ridge area. NPS bird surveys conducted in 2007 documented seven individuals, including singing males, in the Henness Ridge area (NPS 2007).

Yellow Warbler. The yellow warbler inhabits the Henness Ridge area, which contains suitable nesting habitat. The yellow warbler probably breeds at nearby Elevenmile Meadow, where singing males were documented during 2007 bird surveys (NPS 2007).

Pallid Bat. The Henness Ridge site contains suitable habitat for the pallid bat, and the occurrence of this species is likely.

Townsend's Big- eared Bat. Although no surveys have been conducted at Henness Ridge, suitable habitat exists and the occurrence of this species is likely.

Spotted Bat. This species is thought to be an obligate cliff- dweller and is known to travel large distances from its roost sites to forage. It is highly unlikely that it would be found roosting in the project area; however, the spotted bat probably forages in or near Henness Ridge.

Silver- haired Bat. No surveys for silver- haired bats have been conducted at Henness Ridge, but suitable habitat exists for their occurrence.

Western Red Bat. Although no surveys for western red bats have been conducted at Henness Ridge, suitable habitat exists for their occurrence.

Hoary Bat. No surveys for hoary bat have been conducted at Henness Ridge, but suitable non- breeding habitat exists for their occurrence.

Western Small- footed Myotis Bat. Surveys have not been conducted specifically for these species in the vicinity of Henness Ridge area. Although not a common feature in the project area, rock crevices may provide suitable roosting habitat.

Long- eared Myotis Bat. Surveys have not been conducted specifically for these species in the vicinity of Henness Ridge area. Snags, large trees, and hollow trees in the vicinity of Henness Ridge represent suitable roosting habitat for this species.

Fringed Myotis Bat. Surveys have not been conducted specifically for these species in the vicinity of Henness Ridge area. Snags, large trees, and hollow trees in the vicinity of Henness Ridge represent suitable roosting habitat for this species.

Long- legged Myotis Bat. Surveys have not been conducted specifically for these species in the vicinity of Henness Ridge area. Snags, large trees, and hollow trees in the vicinity of Henness Ridge represent suitable roosting habitat for this species.

Yuma Myotis Bat. Surveys have not been conducted specifically for these species in the vicinity of Henness Ridge area. Snags, large trees, and hollow trees in the vicinity of Henness Ridge represent suitable roosting habitat for this species.

Western Mastiff Bat. The western mastiff bat most likely forages in or near Henness Ridge; however, no surveys for the species has been conducted.

Sierra Nevada Mountain Beaver. Mountain beavers are known to occur in the streams that drain from the meadows and ski slopes at Badger Pass (Monroe Meadow). There are seven observations from Chinquapin and Yosemite West and one from the Merced Grove (Yosemite Wildlife Observation Database 2008). Suitable habitat occurs at the Henness Ridge site, where the species likely inhabits the drainages on either side of Henness Ridge.

American Marten. Forest conditions in the vicinity of the Henness Ridge site appear to support the necessary habitat elements used by American martens for foraging, dispersal, and cover. The species has been documented three times (1957, 1974, and 1975) at Badger Pass, including one observation at the nearby water tank (Yosemite Wildlife Observation Database 2009).

Pacific Fisher. Henness Ridge represents prime habitat for Pacific fisher, as indicated by the numerous observations collected from the area. Key fisher habitat features for resting and denning sites are available at Henness Ridge. In the past decade, there have been five road kills and about 15 observations of fisher, the majority of which have occurred along the Wawona and Big Oak Flat Roads near Henness Ridge and Crane Flat. The highest density of fishers in the park is found south of Yosemite Valley, particularly along the Wawona Road and Glacier Point Road corridors (Chow, personal communication, 2008).

Environmental Consequences

Intensity Level Definitions

Impacts to rare, threatened, and endangered species were evaluated using the process described in the introduction to this chapter. Impact threshold definitions for rare, threatened, and endangered species are as follows:

Negligible: Rare, threatened, and endangered species would not be affected, or effects would not be measurable. Any effects to abundance, distribution, and reproductive potential of species would be slight. No mitigation would be required.

Minor: Effects to rare, threatened, and endangered species would be detectable. Construction and operational disturbances could potentially affect breeding success and reduce habitat availability. Mitigation measures would be sufficient to offset minor adverse effects.

Moderate: Effects to rare, threatened, and endangered species would be readily apparent and would result in the reduction of potential habitat required to meet life requisite needs of one or more species. Mitigation would be required to offset moderate adverse effects.

Major: Effects to rare, threatened, and endangered species would be readily apparent and would result in the direct or indirect loss of occupied breeding sites, take of individuals, or habitat degradation resulting in reduced potential for occupancy or reproductive potential. Extensive mitigation would be necessary to offset adverse effects, and its success could not be guaranteed.

Impairment

Definition

A permanent adverse change would occur to one or more rare, threatened, or endangered species affecting the resource to the point that it becomes extirpated from a significant portion of the park or results in the loss of a significant proportion of the park's population such that the park's purposes could not be fulfilled and enjoyment by future generations of the resources would be precluded.

Impacts under Alternative 1 (No- Action Alternative)

Under the No- Action Alternative, the campus at Crane Flat would remain in its existing condition, with no new development or increased use of the campus. No construction- related impacts to special- status species would occur. Operation- related impacts would include disturbance and habitat degradation from campus use and activities.

Operation- related Impacts on Special- status Plants. Campus activities that disturb native vegetation have the potential to disturb or injure special- status plants that occur in the vicinity of Crane Flat, specifically Yosemite rock cress, Bolander's dandelion, and whitneya. Group activities are generally controlled and avoid known sensitive areas, and students are educated about the sensitivity of certain habitats and plants. However, individuals may be trampled, and suitable habitat may be affected, which could affect local populations and would be a noticeable, but minor, impact.

Impact Significance. Local, long- term, minor, adverse impact.

Operation- related Impacts on Special- status Wildlife. Continued campus operations would disturb special- status wildlife in the vicinity of Crane Flat and would continue to preclude species sensitive to human disturbance, such as the Pacific fisher. Campus operations that affect suitable habitat, such as groundwater pumping that can affect the nearby meadows, would continue to affect species (e.g., great gray owl) that rely on the affected habitats for foraging, breeding, nesting, and other uses by reducing the quality of the habitat and possibly forcing the species to relocate or find other suitable habitat in the region. Human disturbance from campus activities and lighting from the campus would continue to reduce the quality of the surrounding habitats and disturb special- status species. Disturbance during the breeding and nesting periods for special-status birds could result in effects on reproductive success, which could affect local populations.

In particular, the great gray owl, California spotted owl, and Pacific fisher have the highest potential to be affected by activities at Crane Flat. Continued campus operations would disturb great gray owls and California spotted owls that rely on the wet meadow habitat and adjacent coniferous forest for foraging opportunities in the vicinity of Crane Flat. Wildman (1992) reported that visitors were present in meadows at Crane Flat at the same time as great gray owls from 5% to 10% of the time and flushed owls about 25% of the time. When flushed by visitors, owls typically flew into the forest and did not return to the meadow 57% of the time to resume hunting; those that returned did so about 50 minutes after human activity had ceased. Campus operations (e.g., groundwater pumping) that affect the nearby meadows would affect Pacific fishers, which rely on riparian corridors for dispersal and resting. Human disturbance and noise pollution from campus activities and facilities would affect owls, which detect their prey primarily by sound, and would thus affect foraging and breeding success of these species. Disturbance during the breeding and nesting periods for owls (great gray owls breed from March through August and California; spotted owls breed from approximately February to September) could result in impacts on reproductive success, which could affect local populations. In addition, great gray owls and Pacific fishers in this area are at high risk of auto collision, which is a significant source of mortality among adult species. The majority of reported fisher sightings and road kills have occurred along the Wawona and Big Oak Flat Roads near Henness Ridge and Crane Flat. In Yosemite National Park, vehicle- related accidents have been identified as a significant cause of adult mortality in fishers and great gray owls.

Impact Significance. Local, long- term, moderate, adverse impact.

Conclusion. No construction- related impacts would occur. Operation- related impacts would include minor disturbance to special- status plants and moderate disturbance and habitat degradation for special- status wildlife.

Impairment. Though there would be some continued adverse effects to special- status species, these species under this alternative would not be impaired.

Impacts under Alternative 2 (Crane Flat Redevelopment)

Under Alternative 2, the Crane Flat campus would be redeveloped, including removing existing buildings, construction of new buildings, and increasing campus use. Construction- related impacts would include loss and disturbance of special- status plants and wildlife. Operation- related impacts would include disturbance and habitat loss or degradation for special- status plants and wildlife.

Construction- related Impacts on Special- status Plants. Construction activities associated with redevelopment and expansion of the Crane Flat campus are not expected to result in direct impacts to special- status plants. No special- status plants have been identified in the development footprint, although a population of Yosemite rock cress, which has been identified to the west of the existing campus, could be disturbed by construction activities (Acree and Grossbacher 2006).

Impact Significance. Site- specific, short- term, negligible, adverse impact.

Construction- related Impacts on Special- Status Wildlife. Construction activities could disturb special- status wildlife using the habitats at and near Crane Flat. Construction activities would result in clearing of vegetation and habitat elements that are suitable for several special- status species, including several birds, bats, and other mammals. These activities would cause individuals within the habitats to scatter or relocate and could result in injury or mortality to individuals that become entrapped or cannot flee. In addition, removal of or disturbance to potentially occupied nesting habitats (e.g., mature conifer and hardwood trees, large hollow trees, broken- top trees, snags, and downed logs) during construction could result in disturbance to or mortality of breeding or roosting animals, interruption of breeding activities, and abandonment by potentially occurring rare, threatened, or endangered species. Although the disturbance would be temporary, mortality of adults, young, or eggs; loss of reproductive potential; or abandonment of breeding sites would be considered a local, long- term, moderate, adverse impact that could affect local populations.

Construction pollutants in runoff that travels offsite could potentially affect several rare, threatened, or endangered species that may occur along or near stream courses or associated wet meadow habitats, including the Yosemite toad, great gray owl, Sierra Nevada mountain beaver, and the Pacific fisher. Degradation of downstream habitat conditions through runoff of sediments and toxins could affect rodent and insect prey populations for these species and result in a reduction of reproductive potential. Construction pollutants are not expected to result in a substantial reduction or degradation of the downstream wetland habitats.

In particular, the great gray owl, California spotted owl, and Pacific fisher have the highest potential to be affected by construction activities at Crane Flat. Construction noise would disturb foraging behavior of great gray owls and California spotted owls, which rely heavily on nearby wet meadow habitats and coniferous forest, and would thus compromise their reproductive success. Vegetation removal for construction operations could result in the removal of important habitat elements, such as snags, woody debris, canopy cover, and large trees for Pacific fisher and owls. Construction activity that would occur during critical breeding and nesting periods for owls (approximately February to September) could result in impacts on reproductive success, which could affect local populations already vulnerable to population declines.

Impact Significance. Local, short- to long- term, moderate, adverse impact.

Operation- related Impacts on Special- status Plants. Increased use of the redeveloped campus would result in similar types of impacts as described under Alternative 1. Campus activities could result in trampling or destruction of native vegetation, including special- status plants, and degradation of suitable habitat for special- status plants. These impacts would be minimized through education and control of group activities, but would be noticeable to the local plant populations if individuals are affected.

Impact Significance. Site- specific, long- term, minor, adverse impact.

Operational- related Impacts on Special- Status Wildlife. Increased campus use could increase unregulated access into undisturbed habitats within and adjacent to the redeveloped campus. Such activities could further degrade habitat conditions and reduce the quality of the habitats for special- status wildlife. In addition, if not carefully regulated, an increase in use of Crane Flat Meadow could affect the distribution and abundance of special- status species that potentially occur in the meadow, such as Yosemite toad, and potentially affect the distribution and abundance of prey species used by several species, including great gray owl and long- eared owl. Vegetation and habitat elements that could potentially support special- status species, such as mature conifer and hardwood trees, large hollow trees, broken- top trees, snags, and downed logs, may be removed and could reduce use of the habitats at Crane Flat by special- status birds and mammals. Habitat loss would be minimal (less than 6 acres), and trees would be retained around new buildings. In addition, disturbed areas around the campus would be restored after construction, thus minimizing the long-term effects on suitable habitat.

Many wildlife species are sensitive to the presence of humans and disturbances caused by human habitation such as lighting and noise. Expanding the existing facility and increasing the number of students under Alternative 2 would also increase the extent and intensity of these human- caused operational disturbances. These disturbances could reduce reproductive success of species breeding and nesting in the vicinity of the redevelopment area and cause short- or long- term abandonment of areas known or potentially used by several special- status wildlife species. For example, an increase in the use of the Crane Flat Meadow could cause abandonment of great gray owl nests or discourage use of the meadow and surrounding forested habitats by great gray owl. Expanding the development footprint and increasing the number of students could also affect nesting success or limit or discourage nesting, denning, or roosting by wildlife that occurs in the vicinity of the redevelopment area, such as California spotted owl, northern goshawk, Vaux's swift, olive-sided flycatcher, hermit warbler, American marten, Pacific fisher, and several bat species.

Disturbances on the landscape that restrict wildlife movement and access to important habitats can affect dispersal, reproductive potential, and distribution of species. The expansion of the existing facility at Crane Flat would create a larger barrier to movement through the local area. However, the size of the expanded development footprint would likely not be sufficient to substantially alter exiting movement patterns of wildlife and access to unique or key habitat areas, such as Crane Flat Meadow.

In particular, the great gray owl, California spotted owl, and Pacific fisher have the highest potential to be affected by activities at Crane Flat. Disturbances to nesting, breeding, foraging, and dispersal of these species would be similar to those discussed in Alternative 1.

Impact Significance. Local, long- term, negligible to moderate, adverse impact.

Conclusion. Construction- related impacts would include negligible to moderate special- status species disturbance during construction. Operation- related impacts would include negligible to moderate human disturbance of special- status species and habitat loss or degradation.

Impairment. Though there would be some continued adverse effects to special- status species, these species under this alternative would not be impaired.

Impacts under Alternative 3 (Henness Ridge Center)

Under Alternative 3, a new campus location and program at Henness Ridge would be established. Crane Flat campus would be removed, and the vegetation restored. Construction- related impacts would include disturbance and take of special- status plants and wildlife. Operation- related impacts would include disturbance and habitat loss or degradation for special- status plants and wildlife. The restoration of Crane Flat would include wildlife habitat restoration and enhancement.

Construction- related Impacts on Special- status Plants. Construction activities at Henness Ridge have the potential to disturb suitable habitat for special- status plants and affect a local population of Fresno mat. Although the majority of the campus has been designed to avoid the population of Fresno mat at Henness Ridge, the road to the water tank will travel through the center of a relatively large population of this disturbance- related plant; thus, individuals may be taken during construction activities. This would result in a slight decline in the local population; however, site restoration after construction would restore disturbed areas that are not developed and could provide an opportunity to replant and salvage individual plants in the development footprint. Inadvertent impacts on other special- status plants that are present in the area may also occur; however, no other species have been identified during surveys of Henness Ridge (Acree and Grossenbacher 2006).

Impact Significance. Site- specific, short- term, minor, adverse impact.

Construction- related Impacts on Special- status Wildlife. Construction of a new campus at Henness Ridge would result in similar types of impacts to special- status wildlife as those described under Alternative 2. Construction equipment and activities would remove vegetation; create noise, lighting, and human disturbances; and reduce the quality of the area for use by wildlife. Although these activities would be short- term in nature, they could affect reproductive success of birds nesting in the vicinity, such as the spotted owl, the flammulated owl, or of bats roosting in trees. In addition, other special- status birds or mammals that are present in the vicinity at the time of construction may be forced to relocate or could be injured by construction equipment, particularly during grading and vegetation removal. The removal of large trees and snags would affect many cavity- dependent species, such as owls, woodpeckers, fisher, and bats.

In particular, flammulated owls, great gray owls, California spotted owls and Pacific fishers are thought to have the highest potential to be affected by construction activities at Henness Ridge. The greatest density of flammulated owls in the park has been observed at Henness Ridge; based on anecdotal observations, a breeding colony has inhabited the site for decades. Construction noise would disturb foraging behavior of owls, and especially nesting behavior of flammulated owls, which would compromise their reproductive success. For the flammulated owl, forced relocation may mean abandonment of their historical breeding grounds altogether. Since very little is known about flammulated owls in the park, this could result in further population declines of an already vulnerable population. Vegetation removal for construction operations could result in the removal of important habitat elements for Pacific fisher, such as snags, woody debris, canopy cover, and nesting and perching sites for owls and bats. Construction activity that would occur during critical breeding and nesting periods for owls (approximately February to October) could result in impacts on reproductive success.

Impact Significance. Local, short- to long- term, moderate, adverse impact.

Restoration- related Impacts on Special- status Plants. The restoration of Crane Flat would include restoring the campus site to natural conditions, removing invasive species, and planting native vegetation. Restoration activities have the potential to disturb populations of the special- status species; however, discontinued use of the Crane Flat campus would have beneficial impacts on the populations of Yosemite rock crest, Bolander's dandelion, and whitneya currently found in the vicinity of the campus. Mitigation measures already in place to protect resources and minimize impacts to sensitive species and habitats would continue.

Impact Significance. Site- specific, short- term, minor, adverse impact. Site- specific, long- term, minor beneficial impact.

Restoration- related Impacts on Special- status Wildlife. The restoration of Crane Flat would include restoring the campus site to natural conditions, with the specific goal of enhancing habitat for special- status wildlife, such as the Pacific fisher and great gray owl. Restoration activities have the potential to temporarily disturb populations of special- status wildlife; however, discontinued use of the Crane Flat campus would have beneficial impacts on the populations of special- status species currently found in at the site because human disturbance, including sound and noise pollution, would greatly decrease. Restoring native vegetation and hydrologic function and topography would help preserve the unique natural features and potentially increase biodiversity of special- status wildlife using the habitats surrounding Crane Flat. Regionally, within the Sierra Nevada, large montane meadows are increasingly rare due to development, and fens are even more unique and sensitive. These ecotones provide highly valuable nesting, foraging, and dispersal habitat for special- status wildlife species, such as the Pacific fisher and great gray owl. Social trails and other campus areas would be revegetated and remaining trails would be minimal. A split- rail fence constructed adjacent to the meadow to restrict meadow access would benefit those special- status wildlife species that rely on wet meadows. Mitigation measures already in place to protect resources and minimize impacts to sensitive species and habitats, such as reducing noise and light pollution, would continue.

Impact Significance. Local, short- term, moderate, adverse impact. Local, long- term, moderate, beneficial impact.

Operation- related Impacts on Special- status Plants. Campus operations at Henness Ridge would result in similar types of impacts as those discussed under Alternative 2. Activities may involve group hikes or wandering that could trample or lead to human disturbance of the local Fresno mat population or of Mt. Lady Slipper orchids in Elevenmile Meadow. These impacts could affect the local populations of special- status plants and could degrade suitable habitat, thus preventing the species from expanding into the area.

Impact Significance. Site- specific, long- term, moderate, adverse impact.

Operation- related Impacts on Special- status Wildlife. Campus operations at Henness Ridge have potential to disturb special- status wildlife that rely on the habitats in the area for nesting, breeding, foraging, roosting, and other uses. The types of impacts from human disturbance and day- to- day activities would be similar to those described under Alternative 2, and impacts on species would be similar because the same species occur in the vicinity of Henness Ridge as in Crane Flat due to a similarity in habitat types. Impacts to special- status species in general would include general disturbance from noise and lighting, habitat loss (approximately 16 acres of montane chaparral and mixed coniferous forest), degradation or reduced quality of the habitat at and surrounding Henness Ridge, potential injury or mortality to wildlife, and reduced reproductive success for birds and bats that have been using the area in the past. Light and noise pollution would affect many special- status wildlife species, in particular breeding birds (including Neotropical warblers, vireos, and flycatchers) and night- dwelling animals such as owls (e.g., spotted owl, great gray owl, and flammulated owl), northern flying squirrel, and fisher (Manci et al. 1988; Rich and Longcore 2006).

Disturbances on the landscape that restrict wildlife movement and access to important habitats can affect dispersal, reproductive potential, and distribution of species. Establishment of a campus at Henness Ridge would create a barrier to movement through the local area. However, the size of the development (approximately 16 acres) would likely not be sufficient to substantially alter exiting movement patterns of wildlife and access to unique or key habitat areas, such as Elevenmile Meadow. Riparian corridors provide important dispersal habitat or landscape linkages for Pacific fishers and provide important rest site elements, such as broken tops, snags, and coarse woody debris (Heinemeyer and Jones 1994; Seglund 1995). However, primary movement corridors following the drainages on either side of Henness Ridge are not anticipated to be directly affected.

Elevenmile Meadow is a relatively large, intact, functioning, healthy meadow system, and surveys revealed several species of owls, including great gray owl, California spotted owl, and flammulated owl. Past observations suggest that Elevenmile Meadow serves as an important transitional site for great gray owls outside of the breeding season, when high- elevation meadows are still covered with snow (Skiff 1995). However, the possibility remains for great gray owls to use this meadow for nesting in some years, which would be affected by campus operation. Campus activities, including daily hikes to Elevenmile Meadow, would create trails that fragment habitat, introduce invasive species and human disturbance, and cause erosion, which would make the habitat less suitable for special- status wildlife that rely on this important habitat for foraging, nesting, and breeding.

Of particular concern at Henness Ridge is the flammulated owl, which is suspected to support the park's largest breeding colony. Campus operations could cause permanent abandonment of Henness Ridge as a historical breeding territory and cause further population declines. Human development and activities, including noise and light and automobile traffic, would affect great gray owl presence, foraging success, and reproductive success both inside and outside Yosemite (Wildman 1992; Maurer 1999).

Campus operation would introduce human disturbance, noise and light pollution at Henness Ridge which would affect denning and resting behavior of Pacific fisher using the site. In addition, increased vehicular traffic as a result of campus operation would have the potential to increase adult mortality in fishers and great gray owls through vehicle- related accidents.

Impact Significance. Local, long- term, moderate, adverse impact.

Conclusion. Construction- related impacts would include moderate special- status species disturbance during construction. Restoration- related impacts would include habitat restoration and enhancement with moderate benefits to special- status species. Operation- related impacts would include moderate human disturbance of special- status species and habitat loss or degradation.

Impairment. Though there would be some adverse effects to special- status species related to new construction at Henness Ridge, restoration at Crane Flat would result in a beneficial impact on special status species. Special status species under this alternative would not be impaired.

NIGHT SKY

As described in the NPS *Interim Outdoor Lighting Guidelines* (2007), light pollution can be created by the upward spill of light from an unshielded light source. "Dust, water vapor and other particles will scatter and reflect light that is emitted into the atmosphere, creating a phenomenon called sky glow. This light that escapes directly upward into the night sky is a major contributor to the loss of the dark night sky. Thus, improper outdoor lighting can impede the view and adversely affect visitor enjoyment of a natural, dark, night sky" (NPS 2007).

The Yosemite National Park *General Management Plan* (1980) stipulates that "unnatural sources of air, noise, visual, and water pollution be limited to the greatest degree possible" (NPS 1980). The NPS *Management Policies* (2006) directs the National Park Service to conserve natural lightscapes, and also includes a Dark Sky Policy that promotes the "preservation and protection of the nighttime environment and dark sky heritage through quality outdoor lighting."

Affected Environment

Yosemite National Park, because of its limited lighted facilities and distance from major metropolitan areas, has generally high- quality night skies. Airborne dust and pollutants from agricultural centers in the Central Valley and smoke from forest and grass fires can periodically diminish the park's night sky quality. Outdoor lighting in the park is generally scattered and in some cases is fully shielded. Accommodations and other facilities in Yosemite Valley are the primary source of artificial light in the park; most of the park is backcountry and offers exceptional night sky viewing.

Crane Flat Setting

The night sky at Crane Flat is generally unaffected by artificial light sources. The Crane Flat area is dark at night because of the limited development in the area. However, Yosemite National Park does provide lighting in developed areas to ensure visitor safety and security. Park- lit areas in the vicinity of Crane Flat include the existing environmental education campus, a gas station/convenience store at the intersection of Big Oak Flat Road and Tioga Pass Road, and the Crane Flat campground (NPS 2003). Other sources of lighting include vehicles traveling at night along Tioga Road and Big Oak Flat Road, but there are no light poles or beacons along these roadways to illuminate the roads or parking areas.

Henness Ridge Setting

The night sky in the vicinity of Henness Ridge is unaffected by artificial light sources because the area is undeveloped. There is essentially no ambient light at the site. Potential sources of night lighting lie to the west of Henness Ridge at the Yosemite West housing development. This development lies approximately 1 mile from the site. Vehicles traveling along the adjacent Wawona Highway and Henness Ridge Road create a source of night lighting.

Environmental Consequences

Intensity Level Definitions

At present, there are no NPS lighting standards available for objectively quantifying the impacts of artificial, unshielded light sources on night sky viewing. The National Park Service does provide guidelines and recommendations for minimizing the potential impacts on the nighttime visual environment, as documented in the NPS *Interim Outdoor Lighting Guidelines* (2007).

Impact threshold definitions for night sky are as follows:

Negligible: The night sky of the area would not be affected, or effects would not be measurable. Any effects to the night sky would be slight and short- term.

Minor: Effects to the night sky, such as an increase or decrease in artificial light sources, would be detectable. If mitigation were needed to offset adverse effects, it would be relatively simple to implement.

Moderate: Effects to the night sky would be readily apparent. Mitigation would probably be necessary to offset adverse effects.

Major: Effects to the night sky would be readily apparent and would substantially change the quality of the night sky over the area. Extensive mitigation would probably be necessary to offset adverse effects, and its success could not be guaranteed.

Impairment

Definition

A permanent adverse change would occur to the night sky in Yosemite National Park, affecting the resource to the point that the park's purposes could not be fulfilled and enjoyment by future generations of the hydrologic resources of the park would be precluded.

Impacts under Alternative 1 (No- Action Alternative)

Under the No- Action Alternative, there would be no new development or reconstruction at the existing Crane Flat campus. The campus would continue to be operated as it has in the past with no improvements or upgrades to existing buildings and lighting. No construction- related impacts would occur. Operation- related impacts would be limited to the ongoing light generated by the existing campus.

Operation- related Impacts on Night Sky. Impacts to night sky visibility would remain minor. The few lights of the campus do not appreciably contribute to a degradation of the quality of night skies in the area.

Impact Significance. Local, long- term, minor, adverse impact.

Conclusion. No construction- related impacts would occur as construction would occur during daylight hours. Operation- related impacts would include a slight glow from campus operations.

Impairment. Though there would be some continued adverse effects to night skies, night skies under this alternative would not be impaired.

Impacts under Alternative 2 (Crane Flat Redevelopment)

Under Alternative 2, the campus at Crane Flat would be redeveloped, including removing existing buildings, constructing new buildings, and expanding the campus and its operations. As part of the redevelopment, all new lighting would be installed consistent with the NPS *Outdoor Lighting Guidelines* (2007) and NPS *General*

Management Plan (1980). Construction- related impacts would occur during nighttime lighting (security). Operation- related impacts would result from lighting from the redeveloped campus.

Construction- related Impacts on Night Sky. Campus redevelopment and construction would likely have negligible impacts on night sky viewing: construction would be conducted during the day and any dust would likely disperse or settle during the night.

Impact Significance. Local, short- term, negligible, adverse impact.

Operation- related Impacts on Night Sky. The long- term impacts on night sky viewing, once the redeveloped campus becomes operational, would be negligible. Fully shielded lighting for the campus, as described in the campus design, would not appreciably contribute to a decrease in the quality of the night sky at Crane Flat.

Impact Significance. Local, long- term, negligible, adverse impact.

Conclusion. Construction- related impacts would include security lighting during construction. Operation- related impacts would include a slight glow during operation of the campus.

Impairment. Though there would be some continued adverse effects to night skies, night skies under this alternative would not be impaired.

Alternative 3 (Henness Ridge Center)

Under Alternative 3, a new campus at Henness Ridge would be developed, and all campus activities would be moved to the Henness Ridge area. The Crane Flat Campus would be restored to essentially natural conditions. As part of the design for the new campus, all lighting would be installed in compliance with the NPS *Outdoor Lighting Guidelines* (2007) and NPS *General Management Plan* (1980). Construction- related impacts would be limited to nighttime lighting for security reasons. Operation- related impacts would result from establishing a new light source at Henness Ridge.

Construction- related Impacts on Night Sky. Campus redevelopment and construction would likely have negligible impacts on night sky viewing: construction would be conducted during the day and any dust would likely disperse or settle during the night.

Impact Significance. Local, short- term, negligible, adverse impact.

Restoration- related impacts on Night Sky. Under Alternative 3, the Crane Flat campus site would be restored to essentially natural conditions. Restoration would include removal of all artificial lighting on the campus site and result in elimination of all existing light sources at the campus.

Impact Significance. Local, long- term, major, beneficial impact.

Operation- related Impacts on Night Sky. The long- term impacts on night sky viewing, once the campus becomes operational, would be minor to moderate, as currently there are no artificial light sources at the site. Fully shielded lighting for the campus, as described in the campus design, would help minimize a decrease in the quality of the night sky at Henness Ridge.

Impact Significance. Local, long- term, minor to moderate, adverse impact.

Conclusion. Construction- related impacts would include security lighting during construction. Operation- related impacts would include campus lighting in an area that currently has no lighted facilities.

Impairment. Though there would be some adverse effects to night skies at Henness Ridge, night skies under this alternative would not be impaired.

SCENIC RESOURCES

Affected Environment

A method used by NPS land use planners and managers to assess scenic quality and visual resources is contrast analysis. The visual contrast analysis concept can be summarized as "the degree to which a project or activity affects scenic quality or visual resources depends on the visual contrasts created or imposed by a project on the existing landscape. The contrasts can be measured by comparing the project's features with the major features in the existing landscape" (Bureau of Land Management [BLM] 1986).

In general, the contrast analysis concept assumes that development- related landscape changes that repeat the natural features of the landscape or are well integrated with existing landscape features are considered to be in harmony with their surroundings. These changes produce low levels of contrast and are considered to have a low impact on existing scenic quality or on the aesthetic values of the landscape. Landscape modifications that do not harmonize with the surrounding landscape are considered to be in contrast with that landscape. The contrasts appear obvious, they stand out, and they can be scenically displeasing to viewers because they are not well integrated with the existing natural landscape.

For the purposes of this EIS, aesthetic or visual analysis involves determining the degree of visual change between the existing landscape (including any existing structures and infrastructure) and the landscape that would result from new development.

Representative viewpoints were selected at each site (Crane Flat and Henness Ridge) using the following criteria:

- Those areas with "visual sensitivity." These would be areas with landscapes that are most interesting and appealing, and for which any changes would likely attract public concern. As a highly scenic and popular national park, it can be assumed that most landscapes within Yosemite National Park have high visual sensitivity.

- The potential number of viewers of the area. The most comprehensive views of the area would be from major thoroughfares and travel intersections. The Crane Flat campus would primarily be viewed by visitors traveling Tioga Road (side view of campus), or hikers along the Tuolumne Grove Trail (forested trail behind campus). The Henness Ridge campus would be primarily viewed by passengers in vehicles traveling Wawona Road.

- The length of time the area is in view. Motorists and hikers on the aforementioned thoroughfares that pass through or close by the area would have the best views of existing scenic quality and any changes to that quality.

- The angle of observation. More weight is given to those potential viewpoints that show more of the area, as more potential impacts would be visible. Views that are elevated, present slopes and aspects that show more of the area are preferred. Conversely, flat areas are not considered ideal representative viewpoints because a relatively small portion of the plan area is likely to be visible.

These viewpoints provide representative views of the existing landscape in and adjacent to these areas, and of potential impacts to the landscape from development, and were established along Tioga Road and Tuolumne Road and Trail adjacent to Crane Flat and Wawona Road and Yosemite West Road adjacent to the Henness Ridge site.

Crane Flat

Crane Flat is generally forested with scattered meadows. The campus site is heavily treed with limited long-distance views. The Crane Flat site was visually recorded from four viewpoints (Figure 3- 6) Three of the viewpoints are located along Tioga Road: Viewpoint A is located at the center of the site, Viewpoint B is near the northern edge of the site, and Viewpoint C is at the southern end of the site.

Another viewpoint (D) is located along Tuolumne Grove Road/Trail at a point where the trail is closest to the area. These points were chosen because motorists traveling in either direction along Tioga Road would have views of the area. Similarly, hikers along the Tuolumne Trail would have views of Crane Flat. It should be noted that Viewpoints A, B, and C show essentially the same landscape features, so only Viewpoint A was used to characterize the landscape from the Tioga Road perspective. Note also that there are no middleground or background views from any of the viewpoints: dense forest and understory vegetation obscure all views within a short distance (70- 100 feet) of the roadways. Representative photographs are provided in Appendix E.

Viewpoint A. This viewpoint ranges from southwest along the Tioga Road to northeast in the opposite direction along the road. All views are in the general direction of Crane Flat. Foreground views are of a flat to gently sloping landscape dominated by dense growths of conifer and occasional deciduous trees, the roadway, and structures adjacent to the roadway. The gray, asphalt roadway creates moderately strong color contrasts with the surrounding dark- green conifers, light- brown duff, and light- green forest floor; however, dappled shading on the road tends to reduce this contrast where shading is created. The trees are coarse- textured, and the visibility of the forest's densely clustered, thick, vertical tree boles creates strong vertical line contrasts with the flat, horizontal roadway. Yellow and brown roadside signs, site infrastructure (the gray dumpster, orange- striped road gate), the tan- colored exposed soil in the roadside parking lot, and roadside snow stakes also create moderate color, line, and form contrasts with the surrounding conifer forest. The Blister Rust Camp buildings are visible, but they present weak color and form contrasts in relation to the surrounding vegetation because the dark- brown building color is compatible with its surroundings and because they are partially hidden by trees along the road shoulder.

Viewpoint D. This view is from a point along the Tuolumne Trail near Crane Flat. The topography toward Crane Flat consists of a gently rising slope that continues steadily upward until obscured from view by dense tree growth. The tall, dense tree growth is coarse- textured. Strong vertical line features are created by the dense, thick tree boles. A light- brown, meandering forest path bordered by cut logs is visible near this trail and creates weak line and color contrasts with the brown and green forest floor. A low, brown- colored, capped water well- head is visible along the Tuolumne Trail edge and creates a strong form contrast with the surrounding landscape because of its regular and obviously human- made construction. Colors from this perspective are predominantly dark- green conifer boughs, light- green forest floor vegetation, grayish- brown conifer tree boles, and light- brown forest duff and decomposing tree trunks. Two buildings or cabins are partially visible in the foreground and present very weak form and color contrasts with the surrounding landscape because of their dark brown coloring and the viewing distance that causes them to blend in with the landscape. With the exceptions of the well- head, partially obscured buildings, and forest path, the view appears natural and undisturbed.

Henness Ridge Setting

Henness Ridge is largely forested with some openings. The campus site is heavily treed with a small area that has long- distance views into the South Fork Merced River canyon. The Henness Ridge site was also recorded from four viewpoints (Figure 3- 7). Viewpoint B is located along Yosemite West Road at the driveway entrance. Viewpoint D is located along Wawona Road, approximately 500 yards south of the Wawona–Yosemite West Road intersection (next to the 35 mph sign). Viewpoint F is located on Wawona Road, along the northbound approach to the Wawona–Yosemite West Road intersection (and near the southern extent of the site). Viewpoint G is located at the intersection of Yosemite West Road and Wawona Road. Representative photographs are provided in Appendix E.

Viewpoint B. From the perspective of this viewpoint along the shoulder of Yosemite West Road, landscape views are partially obstructed by the 6- to 8- foot- high road shoulders. The topography is relatively flat. Exposed soil along the road embankments and on an unpaved access road is buff to tan colored, and it creates a moderately strong line contrast with the light- gray, asphalt roadway. Snow poles are spaced regularly along the road shoulder. Dense stands of dark- green and brown, coarse- textured, tall, vertical conifers dominate the view, and obscure all landscape views beyond approximately 100 feet from the roadway. Understory vegetation is light- green, sparse, and patchy, and presents weak color contrasts with the light- brown forest duff and gray- brown fallen tree limbs, trunks, stumps, exposed rock, and deadfall. An old dark- brown and gray wooden structure (the sand shed, removed in 2009 after heavy snow caused a structural collapse) is clearly visible from the roadway and creates weak form and line contrasts with the surrounding trees and understory vegetation. Evidence of tree- and brush- thinning- related surface disturbances along the roadway creates weak color contrasts with the undisturbed forest floor.

Viewpoint D. This viewpoint is located near the 35 mph sign and fire lane along Wawona Road/Highway 41, along the road shoulder. The landscape features are similar to those described above for Viewpoint B, except that there are no visible structures. Dense stands of tall dark- green and brown conifers dominate the view. Color contrasts are created between the tan- colored exposed soil on the fire lane and steep, high road embankment and the gray asphalt roadway; however, dappled shading tends to reduce this contrast where shading is visible on the roadway. Strong color contrasts are also created by large gray boulders and rocky outcrops along the road shoulder with the surrounding brown and green road shoulder vegetation. Strong line contrasts are also created between the gray roadway and the road- shoulder vegetation. The single vertical road sign creates a weak form and color contrast with the otherwise natural- appearing road shoulder landscape. Some evidence of road- shoulder brush- thinning is visible, but it is not obvious.

Viewpoint F. Viewpoint F is located on the same roadway as Viewpoint D, but further south and near the southern limit of the site. The perspective is relatively narrow for this viewpoint, as it is located on the road shoulder, on a curve, and confined to views into the site. The view is dominated by the dense growth and vertical trunks of tall brown and dark- green colored ponderosa pine. Textures are coarse within the forest and smooth along the gray, flat roadway. The topography is gently sloped to undulating and creates a moderate form contrast with the flat roadway. A moderately strong line and color contrast is created between the brown forest floor and the edge of the gray roadway. A weak color contrast exists between exposed gray-colored boulders and rock outcrops and the brown forest floor duff. A few snow poles and an NPS road sign are visible along the road shoulder, but beyond the road the landscape appears undisturbed.

Viewpoint G. This viewpoint lies at the intersection of Wawona Road and Yosemite West Road. From this perspective, the topography slopes gently downward into the site, and the viewscape ranges from a southward view down Wawona Road to westward views down Yosemite West Road. Road signs and snow poles are visible along the road shoulders at this intersection, but the dark- brown sign coloring mutes the color and form contrasts with the surrounding landscape. As for the other viewpoints, the view from the intersection is dominated by the roadway and dense stands of large, tall conifers. Color, texture, and line contrasts are created between the flat, horizontal, gray- colored, fine- textured asphalt roadway and the vertical dark- green, light- green, and brown- colored coarse- textured trees. A strong line contrast is also created along the road shoulder between the flat, gray roadway and light- green vegetation and brown- colored forest duff. Tree stumps and logs are evidence of roadside thinning, and stumps and logs are also visible in a small clearing downslope from the intersection and adjacent to the roadway.

Environmental Consequences

NPS Scenic Resource Management Direction

The National Park Service does not apply a classification system to managing scenic quality within national parks. As mandated under the Organic Act, all visual resources and scenic quality within national parks are to be conserved unimpaired for the enjoyment of future generations. For purposes of this analysis, potential impairment of the resource is determined using context, intensity, duration, and timing to gauge the level of impacts of proposed actions within the park system. Through the National Environmental Policy Act (NEPA) process, threshold values have been developed to assist the evaluator in determining if an action’s activities would constitute an impairment of visual resources. The threshold values used for assessing impacts are described below and are an adaptation of threshold values used to assess impacts within Glacier National Park (NPS 2003). Note that a major determination would constitute an impairment of the resource because of substantive changes in scenic quality. Substantive changes in visual quality are defined as those project-related landscape contrasts imposed on the existing landscape that would be obviously visible to the casual viewer, be a focus of attention, and dominate the view, in the short term or long term. Temporary impacts are defined as those that would persist during the period of construction. Short- term impacts are defined as those that would persist for less than five years (e.g., during reclamation vegetation establishment and growth); long- term impacts would persist for longer than five years.

As discussed in the NPS *General Management Plan* (1980), a purpose of the park is to “preserve resources that contribute to the park's uniqueness and attractiveness, including its scenic beauty….” Park operations, under the plan, stipulate that the National Park Service “participate with…private interests in planning for compatible management and use of scenic…resources” (NPS 1980).

The management objectives of the park include preserving, protecting, and restoring scenic resources by (1) identifying the major scenic resources and the places from which they are viewed, (2) provide for protection and preservation of existing scenic resources, and (3) permit only those types and levels of use that are compatible with preservation and protection of those resources.

Intensity Level Definitions

Negligible: No short- term or long- term changes to the views of the area or the degree of contrast would occur. Some transient (temporary) visual changes may occur, caused by construction or by the movement of equipment.

Minor: Changes to scenic quality or in the degree of contrast would be short- term only. Limited mitigation would be required.

Moderate: Short- term changes to scenic quality or in the degree of contrast could occur both within and beyond the site. Long- term changes would be limited to the site.

Major: Both short- term and long- term changes in scenic quality or in the degree of contrast would occur both within and beyond the immediate area, and some of these changes may be substantive.

Impairment

Definition

Long- term, development- related landscape contrasts imposed on the existing natural landscape would be obviously visible to the casual viewer. They would be a focus of attention and dominate the view resulting in an inability to fulfill the park's mission of protecting viewsheds.

Impacts under Alternative 1 (No- Action Alternative)

Under the No- Action Alternative, the Crane Flat educational campus would continue to operate and be maintained in its present condition, with no major construction or reconstruction conducted at the site and no change in operations. No construction- related impacts would occur. Operation- related impacts would be limited to the contrasts of existing campus with its surroundings.

Operation- related Impacts on Scenic Resources. Existing buildings offer some contrast from the forested and meadow- dotted terrain of Crane Flat, but the buildings are not highly visible, particularly for those traveling along Tioga Road. The existing campus is heavily treed. However, the parking area along Tioga Road is highly visible.

Impact Significance. Local, long- term, negligible, adverse impact.

Conclusion. No construction- related impacts would occur. Operation- related impacts would include some contrast from existing campus facilities.

Impairment. Though operation- related impacts would include some contrast from existing campus facilities, scenic resources in the park would not be impaired under this alternative.

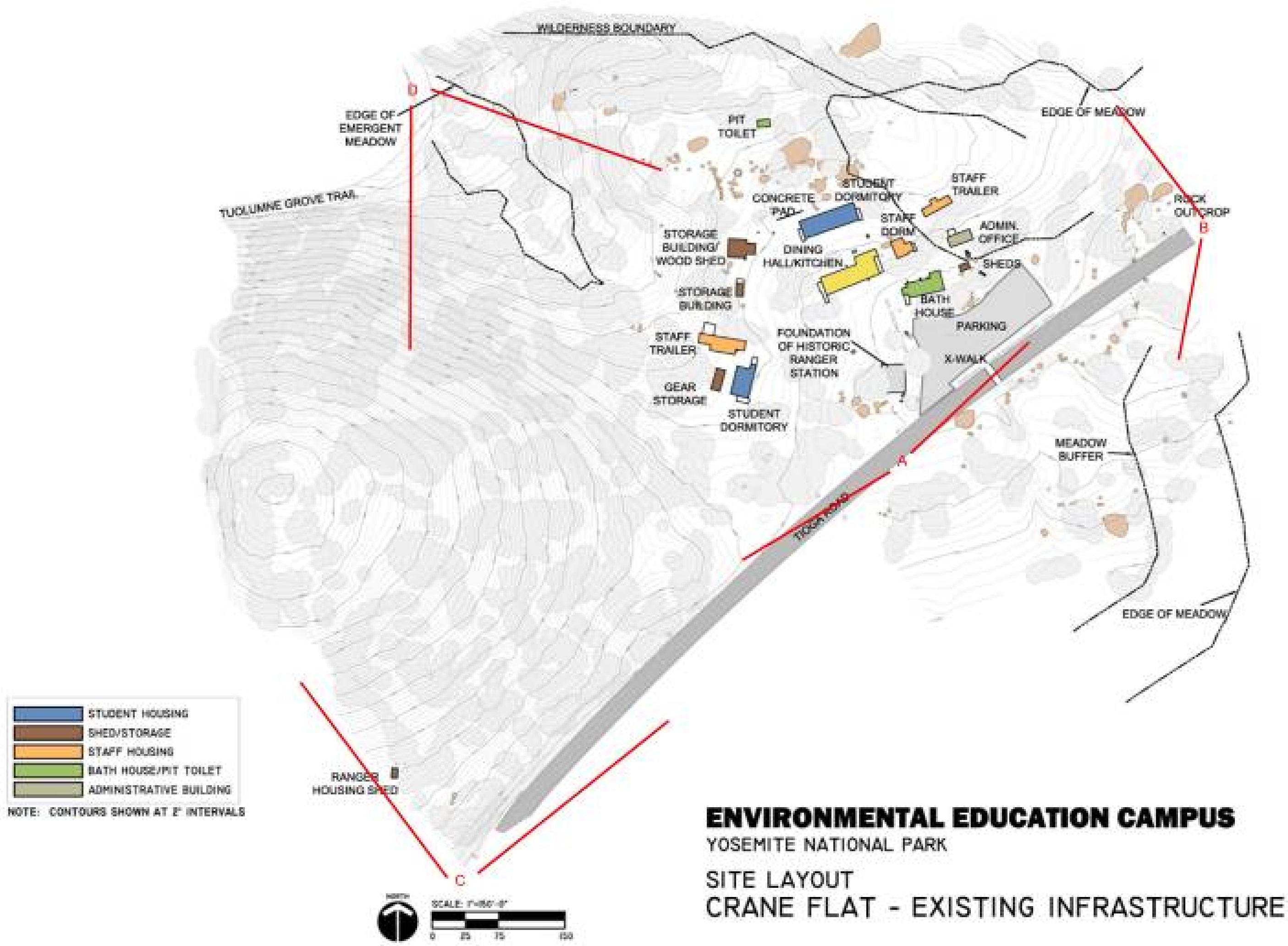

Figure 3-6. Crane Flat Photo Point Locations

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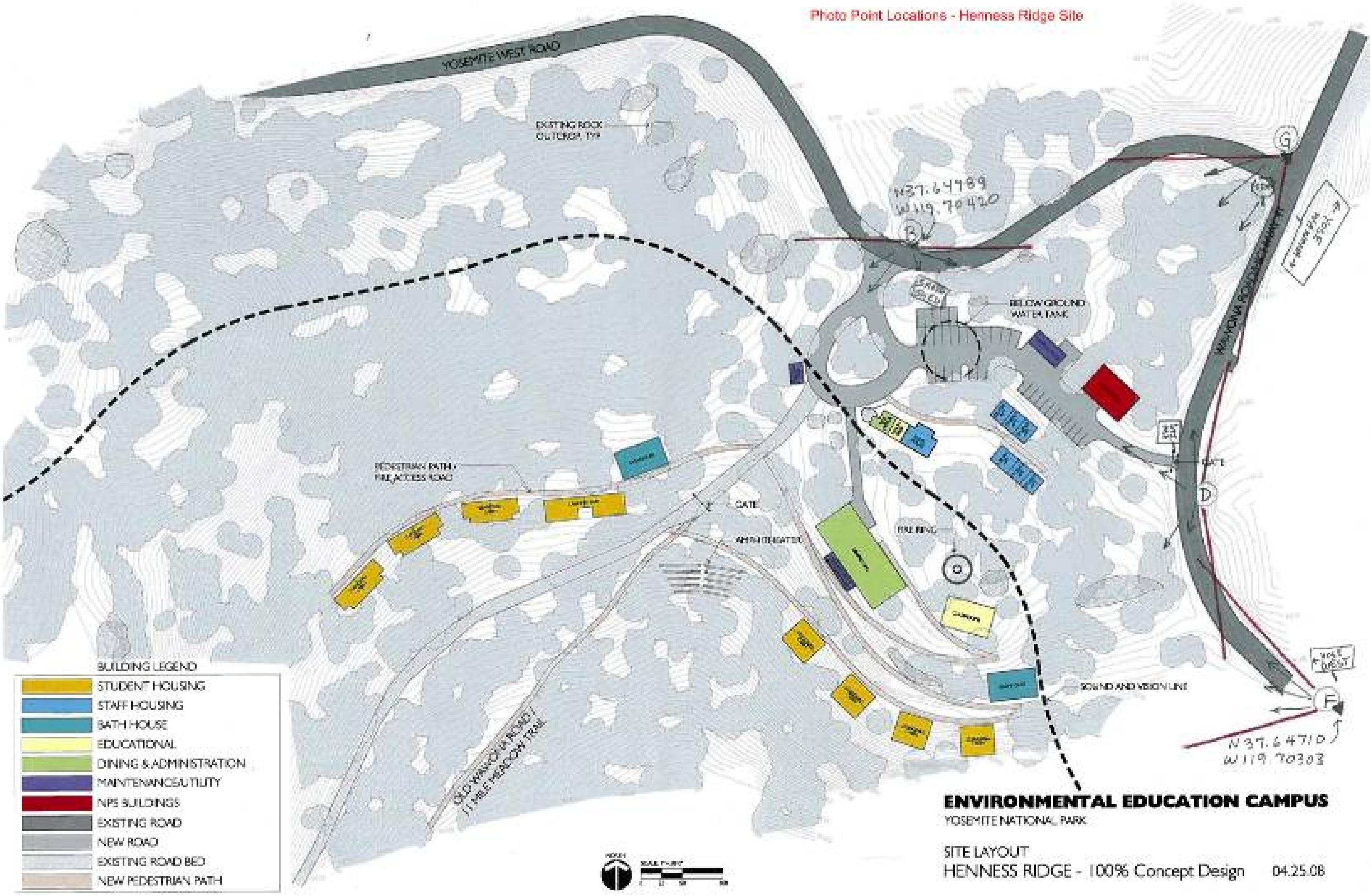

Figure 3-7. Henness Ridge Photo Point Locations

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Impacts under Alternative 2 (Crane Flat Redevelopment)

Under Alternative 2, most of the buildings at the existing environmental education campus would be removed and replaced. The bathhouse and a small shed would be retained. The duration of remodeling construction would be temporary (and expected to last between 12 and 18 months). Equipment staging would be retained both on- campus and offsite. Construction- related impacts would include temporary contrasts from construction equipment, demolished buildings, and exposed soil. Operation- related impacts would include long- term contrasts from new buildings and campus operations.

Construction- related Impacts on Scenic Resources. Dense stands of trees grow up to the road shoulder and prevent views into most of the site; therefore, construction activities within the existing campus would not be highly visible from Tioga Road (Viewpoints A–C). Also, the viewing time of construction activities and construction- related visual intrusions and contrasts by passing motorists would be very brief. Occasionally, exposed soils, demolished buildings, fugitive dust, and construction equipment would be visible from the road, but these activities would create negligible contrast with the surroundings due to the low visibility of the site from the road. Therefore, the temporary impacts of onsite construction equipment, construction vehicles, and personnel would be negligible.

Short- term, moderate, adverse impacts would result from improvements to the parking lot area adjacent to the roadway because of its high visibility. The large area of freshly exposed soil would create obvious color and line contrasts with the surrounding forest floor. However, the plans under this alternative include berm construction along the road shoulder and in front of the parking lot, and planting willows on the berm to screen the parking lot from view, which would ensure minimal long- term contrast.

From Viewpoint D, along the Tuolumne Grove Trail/Road, construction activities would likely have negligible impacts on hikers looking into the campus construction area because the campus reconstruction activities would be beyond the visibility line established for the trail. The view into the campus from this locale is effectively limited by the dense stands of conifers that grow up to the edge of the trail. Therefore, it is unlikely that scenic quality would be substantially affected by construction in the short term or long term.

Impact Significance. Site- specific, short- term, negligible, adverse impact.

Operation- related Impacts on Scenic Resources. Some of the long- term impacts would be beneficial to scenic quality because the currently visible buildings near the roadway, with the exception of the Blister Rust bathhouse and shed, would be removed. These buildings are in disrepair and of poor quality. Revegetation of some of these areas and establishment of a vegetation buffer along the Tioga Road shoulder would return the landscape to a more natural- appearing setting. Those new buildings that are visible would be in line with the rustic architecture of other NPS facilities and would offer less contrast than those currently at the site.

Impact Significance. Site- specific, long- term, minor, beneficial impact.

Conclusion. Construction- related impacts would include temporary visual contrast during construction. Operation- related impacts would include lessened visual contrast from the redeveloped campus.

Impairment. Though construction- and operation- related impacts would include some contrast from existing and redeveloped campus facilities, scenic resources in the park would not be impaired under this alternative.

Impacts under Alternative 3 (Henness Ridge Center)

Under Alternative 3, all buildings would be removed from the Crane Flat campus and the campus would be restored to essentially natural conditions. A new campus would be constructed at the Henness Ridge site. Construction- related impacts would include temporary visual contrast from construction activities. Operation- related impacts would include visual contrast from the new campus and operations at Henness Ridge.

Construction- related Impacts on Scenic Resources. From Viewpoint B, temporary, adverse, and visually intrusive color and form contrasts would likely be produced by construction equipment and vehicles entering and exiting the existing unpaved roadway and from associated fugitive dust. However, the high Yosemite West road embankments would screen or partially block construction of the water tank and parking lot construction from the view of passing motorists. There would likely be temporary adverse impacts to scenic quality from visually intrusive form and color contrasts produced by visible vehicles and equipment from the roadway.

From Viewpoint D, the temporary visual impacts to scenic quality would be the same as discussed for Viewpoint B, but at a different location; entry and exit by construction vehicles and equipment along the existing fire lane would create intrusive color and form contrasts during the construction period. The high roadway embankments and dense tree growth along the road shoulder would screen construction activities from view in the short term and long term.

From the Viewpoint F perspective, there would be negligible impacts to scenic quality from construction and site reclamation; dense forest vegetation and the rising topography would screen the site from view of motorists traveling along Wawona Road.

From Viewpoint G, the closest structures and areas of disturbance, the parking lots and maintenance and NPS buildings, would lie approximately 400 feet from the roadway, and the existing dense vegetation and tree coverage would screen construction activities and structures from view.

Impact Significance. Site- specific, short- term, negligible, adverse impact.

Restoration- related Impacts on Scenic Resources. Under Alternative 3, the Crane Flat campus site would be restored to essentially natural conditions. Restoration activities include the removal of facilities, infrastructure, and social trails and revegetating the area to natural conditions. The historic elements of the campus would remain, including the giant sequoias planted during the CCC era. The restored area would be visible from all viewpoints and provide views of a natural setting without contrast of developed areas containing structures and parking lots. The restored natural setting would result in a site- specific, long- term, major, beneficial impact on scenic resources.

Impact Significance. Site- specific, long- term, major, beneficial impact.

Operation- related Impacts on Scenic Resources. Most of the new campus at Henness Ridge would not be visible from the adjacent roadways or surrounding recreation areas, as it is downslope and screened by numerous trees. Some structures and vehicles in the proposed parking lots (adjacent to the removed sand shed) would create form and color contrasts with the surrounding landscape. However, it should be noted that viewer sensitivity along the Yosemite West Road is low because most motorists along the roadway would either be traveling to or from residences to the west of the site or traveling to the campus (personal communication between Ann Roberts of the National Park Service and David Harris of SWCA, May 2008).

This would reduce the potential impacts from visible structures to a minor level because of lower viewer sensitivity.

Impact Significance. Site-specific, long-term, minor, adverse impact.

Conclusion. Construction-related impacts would include temporary visual contrast from construction activities. Operation-related impacts would include new visual contrast from new buildings, a new water tank, and operations at Henness Ridge, as well as the new well head at Indian Creek.

Impairment. Though construction- and operation-related impacts would include some contrast from new campus facilities, scenic resources in the park would not be impaired under this alternative.

AIR QUALITY

Affected Environment

Yosemite National Park is classified as a mandatory Class I area under the federal Clean Air Act (42 USC 7401 et seq.). This air quality classification is aimed at protecting parks and designated Wilderness areas from air quality degradation. The federal Clean Air Act gives federal land managers the responsibility for protecting air quality and related values from adverse air pollution impacts, including visibility, plants, animals, soils, water quality, visitor health, and cultural and historic structures and objects.

The U.S. Environmental Protection Agency (EPA) and the California Air Resources Board (ARB) designate whether counties in California are in attainment of federal and state (respectively) ambient air quality standards for criteria air pollutants. Crane Flat is located in Tuolumne County, which is part of the Mountain Counties Air Basin. Air quality and emission sources in Tuolumne County are regulated by the Tuolumne County Air Pollution Control District. The area immediately across Tioga Road from Crane Flat lies in Mariposa County, also part of the Mountain Counties Air Basin, but is regulated by the Mariposa County Air Pollution Control District. Henness Ridge is in Mariposa County. Portions of Tuolumne and Mariposa Counties located within Yosemite National Park are designated nonattainment for national and state ozone standards (see Appendix F). The portion of Mariposa County within Yosemite National Park is also designated nonattainment for the state particulate matter smaller than 10 microns (PM-10) standard. Both counties are designated either attainment or unclassified for the remaining national and state standards. As nonattainment areas, conformity under Section 176 of the Clean Air Act is applicable.

The California Environmental Protection Agency (CalEPA) concluded that all of the ozone exceedances in 1995 in the southern portion of the Mountain Counties Air Basin (i.e., Tuolumne and Mariposa Counties) were caused by transport of ozone and ozone precursors from San Joaquin Valley Air Basin (CARB 1996). Air quality in the Mountain Counties Air Basin is also significantly affected by pollutant transport from the metropolitan Sacramento area and the San Francisco Bay Area. In contrast, the San Joaquin Valley Air Basin is considered both a source and a receptor of pollutant transport.

Air quality in the park is affected by emission sources both in and outside of Yosemite National Park. Air pollution sources in the park include stationary sources such as furnaces, boilers, wood stoves, campfires, generators, barbecues, and prescribed fires. Motor vehicles are mobile sources, and emissions primarily include carbon monoxide, nitrogen oxides, and hydrocarbons (or volatile organic compounds). Most of the stationary and area sources are associated with park operations (National Park Service and concessionaire). Campfires and associated emissions, however, are typically generated by visitors. Vehicles and tour buses constitute the largest sources of mobile-source emissions in Yosemite Valley (NPS 2000b).

The air quality in Yosemite National Park is also affected by the transport of pollutant emissions from stationary sources outside of Yosemite National Park. Operations at various power plants, food processors, and industrial facilities—some as far as 60 miles away—emit PM- 10, sulfur dioxide, volatile organic compounds, carbon monoxide, and nitrogen dioxide that are transported within the park (NPS 2000b). Of the sources located within Yosemite Valley, mobile sources constitute the majority of the emissions generated within the valley. To a somewhat lesser extent, campfires and area sources (e.g., space and water heating, fireplaces, power generators, and fuel storage) also contribute to emissions within the valley. Land uses such as residences, schools, and hospitals are considered to be more sensitive than the general public to poor air quality because the population groups associated with these land uses have an increased susceptibility to respiratory distress. Residential areas are considered more sensitive to air quality conditions than commercial and industrial areas because people generally spend longer periods of time at their residences.

Crane Flat Setting

Air quality in the Crane Flat area is generally good, with few major sources of emissions. Campus operations (energy use and wood- burning stoves) and vehicles are the primary sources. Ozone levels are measured at the Turtleback Dome monitoring station, which is located approximately 6 miles east of Crane Flat at approximately 5,300 feet above msl. At this station, data recorded between 2002 and 2006 indicate multiple-day exceedances of the state ozone standard and single- day exceedances of the national standard (Appendix F). The general trend of the data, however, indicates a decrease in ozone pollutants. The nearest PM- 10 measurements are taken at the Yosemite Village monitoring station in Yosemite Valley (approximately 4,000 feet above msl). Data recorded between 2002 and 2006 at this station indicate multiple- day exceedances of the state standard, but no exceedances of the national standard. The general trend of the data indicates an increase in particulate matter at this station.

For the purposes of this analysis, sensitive receptors identified in the vicinity of Crane Flat include staff housing located at Crane Flat and National Park Service staff housing located near the Tuolumne Grove trailhead, approximately 0.25 mile south of the existing campus. Students of the environmental education campus are generally not considered true sensitive receptors because visitors are not exposed to the ambient air quality at these locations over the long term. They may be considered sensitive receptors with respect to dust, however, because excessive dust nearby can result in short- term adverse health effects for people with asthma. Although the Crane Flat campus and nearby facilities draw both adolescent and elderly visitors—population groups sensitive to air quality—their exposure to the ambient air quality in Yosemite National Park is temporary, and they are not considered sensitive receptors to local air emissions.

Henness Ridge Setting

Air quality in the Henness Ridge area is generally good, with minimal emission sources. Vehicles are the primary source, but energy use and wood- burning stoves from the nearby Yosemite West and Wawona residences produce pollutants that may affect the air quality at Henness Ridge. The Yosemite Valley station is the nearest monitoring station; data on particulate matter are discussed under the Crane Flat setting.

Existing sensitive receptors located in the vicinity of the Henness Ridge site consist predominantly of rural residential dwellings. The nearest residential dwellings are located approximately 2,200 feet west off of Henness Ridge Road.

Environmental Consequences

To quantify emissions of each alternative, a computer program (URBEMIS2007) was used to model area and mobile- source emissions (Appendix F) based on default parameters and the project description, including the traffic study prepared by Omni- Means (Appendix H, Omni- Means 2009). Modeling was conducted based on the default parameters contained in the computer model for the Mountain Counties Air Basin. Trip- generation rates used in the analysis were derived from the traffic analysis prepared for this EIS (Omni- Means 2009). Estimated emissions associated with construction and electricity consumption during operation were based on estimated vehicle and equipment use during construction and energy demands associated with the alternatives.

The analysis determined that the alternatives would be within conformity as described by Section 176 of the Clean Air Act because each alternative would generate less than 100 tons per year of emissions—the applicable threshold for conformity (Appendix F).

Intensity Level Definitions

Negligible: Air emissions would not be noticeable or visible.

Minor: Air emissions would be slightly visible and may be noticeable to highly sensitive receptors. Mitigation measures would be relatively simple to implement.

Moderate: Air emissions would be visible and noticeable to sensitive receptors. Mitigation would probably be necessary to offset adverse effects.

Major: Air emissions would be visible and noticeable to nonsensitive receptors. Extensive mitigation would be necessary to offset adverse effects.

Impairment

Definition

Effects to the park's air quality would be severe and long- term and would preclude the protection of the park's air quality for future generations.

Impacts under Alternative 1 (No- Action Alternative)

Under Alternative 1, the campus at Crane Flat would continue to operate as it has in the past, with no new construction or expansion of operations. No construction- related impacts would occur. Operation- related impacts would include stationary source emissions and mobile source emissions from traffic.

Operation- related Impacts of Stationary Sources. Emission sources associated with campus operations would continue to generate air pollutants. The dining hall and student dormitories would continue to be heated by wood- burning stoves, which generate high emissions (particularly concentrations of reactive organic gases and particulate matter) relative to other heating fuels. During the cooler months of October through May, the existing facilities burn approximately 12 cords of wood. The current campus includes permanent residences for two staff and temporary residences for other staff and students (typically one week for students). These receptors may notice visible emissions during use of wood- burning stoves, but the emissions likely only affect highly sensitive receptors at the campus and would only result in adverse effects during the short period of time the stoves are in use and when the students and most staff are at the campus.

These emissions would produce a long- term effect on air quality in the area as the stoves are used throughout the year.

Impact Significance. Local, long- term, minor, adverse impact.

Operation- related Impacts of Mobile Sources. Continued use of the existing campus would generate vehicle emissions from users traveling to and from the site. These emissions contribute to the overall air emissions in the park and are considered minimal in comparison to the total vehicle emissions produced on a daily basis, based on the low volume of traffic generated by the campus. Vehicle emissions are not likely noticeable to sensitive receptors at the campus due to the low number of vehicles using the campus at any one time. For information purposes, operational emissions of criteria air pollutants associated with Alternative 1 were quantified and are summarized in Table 3- 5. In the long term, vehicle emissions are expected to decrease as newer and cleaner vehicles replace older ones.

Impact Significance. Local, long- term, negligible, adverse impact.

Conclusion. No construction- related impacts would occur. Operation- related impacts would include minor stationary source emissions and negligible mobile source emissions.

Impairment. Though operation- related impacts would include some adverse effects to air quality, air quality in the park would not be impaired under this alternative.

Table 3-5. Predicted Long-term Operational Emissions

Alternative/Source	Emissions (tons/year)*			
	VOC	NO_X	PM-10	PM-2.5
Alternative 1				
Mobile	0.03	0.10	0.05	0.01
Electricity Use**	0	0.02	0.00	0
Gas Use (Space & Water Heating)	0	0	0	0
Hearth	1.69	0.02	0.26	0.25
Total	1.72	0.14	0.31	0.26
Alternative 2				
Mobile	0.11	0.55	0.20	0.05
Electricity Use**	0	0.01	0.00	0.00
Gas Use (Space & Water Heating)	0	0.04	0.00	0.00
Hearth	0	0.00	0.00	0.00
Total	0.11	0.60	0.20	0.05
Net Change	-1.61	0.46	-0.11	-0.21

Table 3-5. Predicted Long-term Operational Emissions

Alternative/Source	Emissions (tons/year)*			
	VOC	NO_X	PM-10	PM-2.5
Alternative 3				
Mobile	0.12	0.55	0.19	0.05
Electricity Use**	0.00	0.01	0.00	0.00
Gas Use (Space & Water Heating)	0.00	0.06	0.00	0.00
Hearth	0.00	0.00	0.00	0.00
Total	0.12	0.62	0.19	0.05
Net Change	-1.60	0.47	-0.12	-0.21

*Emissions from mobile sources, gas use for space and water heating, and use of wood-burning hearth devices were calculated using the URBEMIS2007 computer program, based on default parameters (i.e., emission factors, vehicle fleet, and trip distribution data) contained in the model and trip generation rates obtained from the traffic analysis prepared for this EIS.
**Emissions of criteria pollutants associated with electricity use were calculated based on emission factors obtained from the South Coast Air Quality Management District's CEQA Air Quality Handbook (1993) and usage rates developed for this EIS.

Impacts under Alternative 2 (Crane Flat Redevelopment)

Under Alternative 2, the campus at Crane Flat would be redeveloped, including removing existing buildings, constructing new buildings in a slightly larger footprint, and increasing campus operations. Construction-related impacts would include mobile source emissions, dust, and other pollutants associated with building demolition. Operation- related impacts would include stationary source emissions and mobile source emissions from increased traffic.

Construction- related Impacts on Air Quality. Air quality effects associated with the demolition of existing structures and construction of new facilities for redevelopment of the Crane Flat campus include temporary engine and dust emissions from a variety of sources. Demolition of existing structures and construction of new facilities could generate substantial amounts of dust, including PM- 10 (primarily fugitive dust from demolition activities and tailpipe emissions from the operation of heavy- duty equipment). Dust emissions would vary from day to day, depending on the level and type of activity, silt content of the soil, and weather conditions.

Emissions generated from construction and demolition activities would also include tailpipe emissions from heavy- duty equipment, worker commute trips, and truck trips to haul debris materials from the campus at Crane Flat to appropriate recycling facilities or reuse sites and to supply the site with new construction materials. Both mobile and stationary equipment would generate emissions of ozone precursors, carbon monoxide, and PM- 2.5 (criteria air pollutants) as well as toxic air contaminants from use of diesel- powered equipment. Toxic air contaminants are less pervasive in the atmosphere than criteria air pollutants, but they are linked to short- term (acute) and long- term (chronic or carcinogenic) adverse human health effects. Toxic air contaminants do not have corresponding ambient air quality standards. The temporary duration of the construction period (12 to 18 months) would limit the potential for tailpipe emissions and diesel particulates to adversely affect local air quality. Because Yosemite Institute would temporarily discontinue environmental education programs at the Crane Flat facility during campus redevelopment, and because the surrounding area is not expected to experience high levels of recreational use, little to no sensitive receptors would be exposed to high concentrations of demolition or construction emissions.

Impact Significance. Local, short- term, negligible, adverse impact.

Operational- related Impacts of Stationary Source Emissions. Operation of the redeveloped campus would result in an overall reduction in emissions of reactive organic gases and airborne particulate matter because wood- burning stoves would no longer be used for space heating. Instead, cleaner- burning gas wall heaters would be used, which would result in an overall decrease in emissions. Smoke in the student dorms and dining hall would no longer be perceptible. The photovoltaic system is estimated to provide more than 50% of the electricity demand, which would result in an overall decrease in emissions associated with electricity consumption.

Impact Significance. Local, long- term, negligible, beneficial impact.

Operation- related Impacts of Mobile Source Emissions. Mobile source emissions would increase slightly due to increased vehicle trips to and from the campus, and the increase in emissions could be noticeable to highly sensitive receptors at the campus. Because air quality at the existing campus is good, the introduction of more mobile source emissions could result in local increases in air pollution that are perceptible to certain receptors (e.g., people with asthma and the elderly), although overall air quality would continue to be good. Vehicle emissions are also expected to decrease over the long term as newer and cleaner vehicles replace older ones; therefore, emissions would likely decrease in the future and become less noticeable.

Impact Signifiance. Local, long- term, minor, adverse impact.

Conclusion. Construction- related impacts would include negligible mobile source emissions and construction pollutants. Operation- related impacts would include negligible stationary source emissions and minor mobile source emissions.

Impairment. Though construction- and operation- related impacts would include some adverse effects to air quality, air quality in the park would not be impaired under this alternative.

Impacts under Alternative 3 (Henness Ridge Center)

Under Alternative 3, a new campus and program would be developed at Henness Ridge and the Crane Flat campus would be restored to essentially natural conditions. The program would allow for an increased number of students and would expand campus operations while using energy- efficient designs for buildings and facilities. Construction- related impacts would include mobile source emissions and fugitive dust. Operation- related impacts would include stationary source emissions and mobile source emissions from increased operations.

Mariposa County and Tuolumne County are currently in nonattainment for the federal ambient ozone standard; therefore Section 176 of the Clean Air Act requires preparation of a conformity analysis. To verify conformance with EPA regulations, SWCA calculated potential pollutant emissions which would result from the preferred alternative using the URBEMIS 2007 modeling program, and compared them to thresholds of significance (Appendix F). The results indicate that potential emissions are well below thresholds of significance for ozone, PM10, and other potential pollutants. Further, the majority of the emissions that would result from the preferred alternative are from short- term, temporary construction activities. Based on this, it is determined that the preferred alternative would not contribute to further nonattainment of federal ozone standards and should be considered in conformance with the Clean Air Act and applicable EPA regulations.

Construction-related Impacts on Air Quality. Construction of a new campus at Henness Ridge would generate similar types of emissions as redevelopment of the campus at Crane Flat due to use of similar equipment and similar activities. Although the Henness Ridge site has minimal existing sources of emissions (primarily vehicle emissions), there are no sensitive receptors in proximity to the site. Construction activities at Henness Ridge would generate emissions that would contribute in the short term to air quality impacts; however, no sensitive receptors would be affected by these emissions. Residents of Yosemite West may notice the activities as they pass by the site, but the nearest residence is approximately 2,200 feet away, and emissions would not likely be noticeable at this distance due to intervening topography and vegetation.

Impact Significance. Local, short-term, negligible, adverse impact.

Restoration-related Impacts on Air Quality. Restoration of the Crane Flat campus would include demolition and removal of buildings, infrastructure, and parking areas. The site would then be restored to original topography and revegetated with native plant species. Air quality effects associated with the demolition of existing structures include temporary engine and dust emissions from a variety of sources. Demolition of existing structures could generate substantial amounts of dust, including PM-10 (primarily fugitive dust from demolition activities and tailpipe emissions from the operation of heavy-duty equipment). Dust emissions would vary from day to day, depending on the level and type of activity, silt content of the soil, and weather conditions.

Emissions generated from demolition activities would also include tailpipe emissions from heavy-duty equipment, worker commute trips, and truck trips to haul debris materials from the campus at Crane Flat to appropriate recycling facilities or reuse sites. Both mobile and stationary equipment would generate emissions of ozone precursors, carbon monoxide, and PM-2.5 (criteria air pollutants) as well as toxic air contaminants from use of diesel-powered equipment. Toxic air contaminants are less pervasive in the atmosphere than criteria air pollutants, but they are linked to short-term (acute) and long-term (chronic or carcinogenic) adverse human health effects. Toxic air contaminants do not have corresponding ambient air quality standards. The temporary duration of the demolition and restoration period would limit the potential for tailpipe emissions and diesel particulates to adversely affect local air quality.

Upon completion of restoration related construction activities and removal of campus operations in the Crane Flat area, air quality would improve because campus activities would not longer generate air quality pollutants. Pollutants removed include of stationary source emissions associated with wood burning and mobile source emissions associated with vehicular traffic.

Impact Significance. Local, short-term, negligible, adverse. Local, long-term, minor, beneficial.

Operation-related Impacts of Stationary Source Emissions. Operation of a campus at Henness Ridge would generate similar types of stationary source emissions as the redeveloped Crane Flat campus due to similar designs and energy efficient measures, except the emissions-reducing geothermal heating system. Although the campus at this location would introduce new sources of pollutants to the Henness Ridge area and would bring new sensitive receptors (new students and staff at the campus), the design features would minimize emissions from energy use and heating to ensure emissions are not noticeable to sensitive receptors.

Impact Significance. Local, long-term, negligible, adverse impact.

Operation- related Impacts of Mobile Source Emissions. Operation of a campus at Henness Ridge would also generate similar types of mobile source emissions as the redeveloped Crane Flat campus due to similar vehicle trips. The increase in vehicle trips on roadways in the vicinity would also increase mobile source emissions in the area, including introducing mobile source emissions to the currently undeveloped Henness Ridge site. Because air quality in the area is currently good, campus vehicle emissions would contribute to air impacts, but would not be a major contribution due to the low volumes of traffic. Although no sensitive receptors are currently located at the site, the new campus would house students and staff, who would be considered sensitive receptors. Mobile source emissions from vehicle traffic in the area, including added traffic from campus operations, may be noticeable to highly sensitive receptors using the campus.

Impact Significance. Local, long- term, minor, adverse impact.

Conclusion. Construction- related impacts would include negligible mobile source emissions and construction pollutants. Operation- related impacts would include negligible stationary source emissions and minor mobile source pollutants.

Impairment. Though construction- and operation- related impacts would include some adverse effects to air quality, air quality in the park would not be impaired under this alternative.

SOUNDSCAPE

In accordance with NPS *Management Policies* (2001) and DO 47 (NPS 2000a), *Sound Preservation and Noise Management*, an important part of the NPS mission is preservation of natural soundscapes associated with national park units. Natural soundscapes exist in the absence of human- caused sound. The natural ambient soundscape is the aggregate of all the natural sounds that occur in park units, together with the physical capacity for transmitting natural sounds. Natural sounds occur within and beyond the range of sounds that humans can perceive and can be transmitted through air, water, or solid materials.

By definition, noise is human- caused sound that is considered unpleasant and unwanted. Whether a sound is considered unpleasant depends on the individual who hears the sound and the setting and circumstance under which the sound is heard. While performing certain tasks, people expect and, as such, accept certain sounds that are considered unpleasant under other circumstances. For example, if a person works in an office, sounds from printers, copiers, telephones, and keyboards are generally acceptable and not considered unduly unpleasant or unwanted. By comparison, when resting or relaxing, these same sounds may be intolerable.

Sound levels are usually measured in A- weighted decibels (dBA), and descriptors such as the energy equivalent noise level (Leq) and the day- night average noise level (Ldn) are commonly used to account for fluctuations of sound over time. Generally, a 3- dBA increase in ambient sound levels is considered the minimum threshold at which most people can detect a change in the sound environment; an increase of 10 dBA is perceived as a doubling of the ambient sound level.

Sounds found desirable during times of rest and relaxation are referred to as natural quiet, and include natural, outdoor ambient sounds, without the intrusion of human- caused sounds. Natural sounds throughout Yosemite National Park—including waterfalls, flowing water, animals, and rustling leaves—are not considered noise. The enjoyment of natural sounds along the river contributes to the Yosemite National Park visitor's experience, and natural quiet can be essential in order for some individuals to achieve a feeling of peace and solitude.

Affected Environment

Natural sources of sound in Yosemite National Park include waterfalls, rushing water, wind, and wildlife. There is also noise from human activities and mechanical devices such as automobiles, trucks, and transit buses. Ambient sound levels in Yosemite National Park vary by location and also by season (the volume of water in the waterfalls and rivers is lower in the fall and higher in the spring). Ambient sound levels are also influenced by the number of visitors to the park and by the proximity of mechanical noise sources. The existing sound environment changes dramatically throughout the year in direct proportion to the level of park use with ambient levels during the summer generally being higher than winter levels. Changes are due primarily to increases in vehicle traffic on area roadways and visitor- related noise (NPS 2000a).

Some land uses are considered more sensitive to ambient noise levels than others because of the amount of noise exposure (in terms of both exposure duration and insulation from noise) and the types of activities typically involved. Residences, hotels, campgrounds, schools, hospitals, and outdoor recreation areas are generally more sensitive to noise than commercial and industrial land uses.

Crane Flat Setting

Existing noise at Crane Flat results from mechanical sources, such as motor vehicles, generators, buses, delivery trucks, mechanical devices associated with building operations, and aircraft, and from human activities, such as talking and yelling. Ambient noise levels are primarily influenced by users of the existing environmental education campus and vehicle travel on Tioga Road. Natural sounds near Crane Flat, such as wind rustling through trees, flowing water, birds, and animals, are not considered to be noise but do contribute to the overall sound environment.

Sound- level measurements were obtained on a weekday in September 2002 at four locations in the vicinity of Crane Flat; the existing campus was not in use at this time. Each measurement was taken for a 10- minute period during the afternoon with a Metrosonics dosimeter (Model 308- b). The dosimeter was calibrated with a Metrosonics sound- level calibrator. Table 3- 6 displays the average sound level, maximum sound level, and location of each measurement.

One noise measurement was taken on the premises of the existing environmental education campus at Crane Flat between the shower house and the parking lot, a distance of 100 feet from the centerline of Tioga Road. The measurement indicated a mid- afternoon noise level of 54.1 Leq, which was primarily influenced by traffic noise. Another measurement was taken in the meadow on the opposite side of Tioga Road from the campus site, a distance of approximately 300 feet from Tioga Road. Traffic noise was less prominent from this location; insects and other natural sounds were easily audible. A noise level of 43.7 Leq was measured at this location, with a maximum recorded sound level (Lmax) of 52.8 dBA. A third measurement was taken next to the employee residence at the Tuolumne Grove parking lot, and a fourth measurement was collected at a picnic table on the south side of the Tuolumne Grove parking lot. Both measurements indicated mid-afternoon sound levels between 48 and 49 Leq. Traffic on Tioga Road accounted for most of the noise, along with the hum of the utility shed in the parking lot, visitors' voices, and cars pulling in and out of the parking lot.

People using the existing environmental education campus at Crane Flat are considered sensitive receptors because the campus serves as a retreat with overnight lodging and recreation facilities. Park visitors using the campgrounds, trails, and recreation areas located along Tioga Road in the vicinity of the campus are also sensitive receptors to noise. Excessive noise (in duration or intensity) detracts from the visitor experience at the park.

Table 3-6. Sound-Level Measurements in the Vicinity of the Environmental Education Campus at Crane Flat

Number	Location	Distance from Tioga Road (Centerline)	Time	Description of Sound/ Noise Sources	Leq* dBA	Lmax** dBA
1	Environmental Education Campus	100 feet	1:00 pm	Traffic, conversation	54.1	65.8
2	Meadow across Tioga Road from campus	300 feet	1:20 pm	Traffic, insects, woodpecker, birds, breeze blowing grass	43.7	52.8
3	Employee housing at Tuolumne Grove trailhead (approximately 80 feet uphill from Tioga Road)	100 feet	2:30 pm	Birds, idling cars, visitor activity at parking lot, traffic, hum of transformer	48.9	58.0
4	Picnic tables on south side of Tuolumne Grove parking lot	150 feet	3:10 pm	Conversation, traffic, hum of transformer, trash cans, birds, car doors	48.4	56.8

*Logarithmic average of the sound during a 10-minute duration
**Lmax = maximum sound level recorded during a noise event
Source: Environmental Science Associates Administrative Draft EIS, 2003

Henness Ridge Setting

Ambient sound levels in the vicinity of the Henness Ridge site are influenced primarily by vehicle traffic on Wawona Road, which is located adjacent to the eastern boundary of the site. To a lesser extent, vehicle traffic on other nearby roadways, including Henness Ridge Road, also contribute to the ambient environment. Noise from motor vehicles is loudest immediately adjacent to the roadways, but due to generally low background sound levels, can be audible a long distance from the roads. Atmospheric effects such as wind, temperature, humidity, topography, rain, fog, and snow can affect the presence or absence of motor vehicle noise. Noise levels from motor vehicles would be loudest where and when activity levels are the greatest and nearest to the sources of noise (NPS 2000a).

Existing sensitive receptors in the vicinity of the Henness Ridge site consist predominantly of rural residential dwellings. The nearest residential dwellings are located approximately 2,200 feet west of the site along Henness Ridge Road.

Environmental Consequences

Intensity Level Definitions

Negligible: Negligible impacts would not be detectable.

Minor: Minor impacts would be slightly detectable, but would not be expected to have an appreciable effect on ambient noise levels.

Moderate: Moderate impacts would be clearly detectable and could have an appreciable effect on ambient noise levels; moderate adverse impacts may include introduction of noise associated with an activity or facility into an area with little or no ambient noise.

Major: Major impacts would be clearly audible against ambient noise levels, or would have a substantial, highly noticeable effect on ambient noise levels.

Impairment

Definition

Effects to the park's soundscape would be severe and long- term and would preclude the protection of the park's soundscape for future generations.

Impacts under Alternative 1 (No- Action Alternative)

Under Alternative 1, campus operations at Crane Flat would continue as they have in the past. No new construction or changes in operations would occur. No construction- related impacts would occur. Operation- related impacts would include ongoing campus activities that generate noise.

Operation- related Impacts on Soundscape. Noise generated by outdoor educational activities associated with regular campus operations would continue to affect ambient noise levels in the vicinity of the Crane Flat campus. Sounds generated by campus operations would continue to include human voices, noise associated with educational activities, and vehicle noise as people enter and exit the campus. These sounds contribute to the existing noise levels in the vicinity of the campus although they are higher than ambient noise levels. Park visitors using the campgrounds, trails, and recreation areas along Tioga Road in the vicinity of the campus likely notice noise generated by campus operations when other sounds do not intervent (like wind or vehicle noise). Campus sounds may occasionally dominate the soundscape, but they are not typically the dominate sources of sound in the vicinity.

Impact Significance. Local, long- term, minor, adverse impact.

Conclusion. No construction- related impacts would occur. Operation- related impacts would include minor noise generated by campus operations.

Impairment. Though operation- related impacts would include some adverse effects to the soundscape, the park's soundscape would not be impaired under this alternative.

Impacts under Alternative 2 (Crane Flat Redevelopment)

Under Alternative 2, the existing campus would be redeveloped, including removing or demolishing existing buildings, constructing new buildings, and increasing campus operations. The campus would not be in operation during the construction period. Construction- related impacts would include noise generated by construction equipment and activities. Operation- related impacts would include noise generated by increased campus operations.

Construction- related Impacts on Soundscape. The type of noise generated during the construction period would include the operation of heavy equipment, voices of construction workers, and noise associated with material haul vehicles; such noise could affect nearby recreational users on trails, in nearby meadows, or at the trailhead to the Tuolumne Grove of Giant Sequoias. Table 3- 7 provides typical noise levels generated by various types of heavy equipment that could be used during construction activities. These noise levels are substantially higher than the existing ambient noise in the Crane Flat area, with some equipment almost doubling the noise levels.

Table 3-7. Typical Construction Equipment Noise Levels

Equipment	Typical Noise Level (dBA) 50 Feet from the Source
Air Compressor	81
Backhoe	80
Compactor	82
Concrete Mixer	85
Concrete Pump	82
Crane, Derrick	88
Crane, Mobile	83
Dozer	85
Generator	81
Grader	85
Impact Wrench	85
Jack Hammer	88
Loader	85
Paver	89
Pneumatic Tool	85
Pump	76
Rock Drill	98
Roller	74
Saw	76
Scraper	89
Truck	88

dBA = A-weighted decibels
Source: Federal Transit Administration 2006

Operation of heavy equipment could generate substantial amounts of noise in the vicinity of the Crane Flat campus and could occur in proximity to nearby recreational uses. Other sensitive land uses, such as visitor services and facilities and employee residences at the parking lot for the Tuolumne Grove, are located farther from the site and would be affected to a lesser extent, as noise levels decrease the greater distance they are from the source. Noise effects in the construction area would vary depending upon a number of factors, such as the number and types of equipment in operation on a given day, usage rates, the level of background noise in the area, and the distance between sensitive uses and demolition and construction activities. Although limited to the construction period, construction noise would be noticeable to visitors at nearby recreation areas and could dominate the noise environment during heavy equipment use or grading and demolition.

Impact Significance. Local, short-term, moderate, adverse impact.

Operation-related Impacts of Nonvehicle Noise. The increase in capacity of the educational campus to house a total of 154 students would result in an increase in overall activity and associated nonvehicle noise levels generated on and near the Crane Flat campus. Student and student-teacher conversation, educational programs, and student play would represent the most typical nonvehicle noise in this area. Local ambient noise levels would increase, as would peak noise associated with loud conversation. Noise level increases have the potential to be noticeable to recreational users of nearby trails and meadows, as well as visitors and residents near the parking lot for the Tuolumne Grove. Use of indoor activity and teaching space, including classrooms, instructor preparation space, laboratories, and administration facilities, would minimize the amount of noise generated by activities. However, nonvehicle noise would still be perceptible to nearby visitors and users.

Impact Significance. Local, long-term, minor, adverse impact.

Operation-related Impacts of Vehicle Noise. Due to the increase in student capacity, overall activity, and associated vehicle noise levels generated on and near the Crane Flat campus would be slightly increased. Based on the traffic analysis prepared for this EIS, the increase in student capacity would result in an estimated increase of approximately three bus round trips per week. Under Alternative 2, a doubling of vehicle traffic on area roadways is not anticipated. Typically, a doubling of vehicle traffic would be required before a noticeable change in noise levels would be detectable by the human ear. Overall, the number of additional vehicle trips associated with campus operations under Alternative 2 would be imperceptible relative to the total traffic volume on Tioga Pass Road and other park roads on typical days.

Impact Significance. Local, long-term, negligible, adverse impact.

Conclusion. Construction-related impacts would include moderate construction equipment noise. Operation-related impacts would include minor nonvehicle noise from campus activities and negligible vehicle noise from increased traffic.

Impairment. Though construction- and operation-related impacts would include some adverse effects to the soundscape, the park's soundscape would not be impaired under this alternative.

Impacts under Alternative 3 (Henness Ridge Center)

Under Alternative 3, a new campus and program would be developed at the Henness Ridge site and the Crane Flat campus would be restored to essentially natural conditions. Construction-related impacts would include noise from construction equipment and activities. Operation-related impacts would include noise from campus activities and traffic.

Construction-related Impacts on Soundscape. Similar types of construction noise would be generated during construction activities at Henness Ridge as were discussed for the redevelopment of Crane Flat (Alternative 2). Noise sources would include construction equipment, construction-related traffic, and human voices and activities. Receptors in the vicinity of Henness Ridge, including residents at Yosemite West and visitors using recreation areas in the vicinity, would not be exposed to loud noises from construction due to their distance from the site. In addition, the topography and dense forest that separate the site from the receptors would also mask the noise and minimize construction- related sound.

Impact Significance. Local, short- term, negligible, adverse impact.

Restoration- related Impacts on Soundscape. Restoration of the Crane Flat campus would include demolition and removal of structures and all site infrastructure, restoring site topography, and revegetation of the area with native plant species. The type of noise generated during restoration activities would include the operation of heavy equipment, voices of construction workers, and noise associated with material haul vehicles; such noise could affect nearby recreational users on trails, in nearby meadows, or at the trailhead to the Tuolumne Grove of Giant Sequoias. Table 3- 7 provides typical noise levels generated by various types of heavy equipment, some of which may be used during restoration activities. These noise levels are substantially higher than the existing ambient noise in the Crane Flat area, with some equipment almost doubling the noise levels. Operation of heavy equipment would generate substantial amounts of noise in the vicinity of the Crane Flat campus and could occur close to nearby recreational uses. Although limited to the construction period, construction noise would be noticeable to visitors at nearby recreation areas and could dominate the noise environment during heavy equipment use or grading and demolition.

Upon completion of restoration- related construction activities and removal of campus operations at the Crane Flat campus, soundscape resources would improve with ceased noise generation from outdoor educational activities associated with regular campus operations. Ambient noise levels in the vicinity of the Crane Flat campus would be greatly reduced. Park visitors using the campgrounds, trails, and recreation areas along Tioga Road in the vicinity of the campus will no longer be subject to noise generated by campus operations when other sounds do not intervent (like wind or vehicle noise).

Impact Significance. Local, short- term, moderate, adverse. Local, long- term, minor, beneficial.

Operation- related Impacts of Nonvehicle Noise. Operation of a campus at Henness Ridge would generate similar types of noise as discussed for the redevelopment of Crane Flat (Alternative 2). An outdoor amphitheater would be constructed at Henness Ridge, but it would be shielded from direct line- of- sight to nearby existing residential dwellings by intervening terrain, thus ensuring minimal noise generated from the amphitheater would reach the residents. Use of indoor activity and teaching space, instructor preparation space, laboratories, and administration facilities would help minimize effects on ambient noise levels. Depending on the activities conducted and time of day during which onsite activities occur, resultant noise levels could be slightly detectable for brief periods of time at the nearest residential land uses. Because of the intervening shielding provided by existing terrain and the distance to the nearest existing residential dwellings (i.e., 2,200 feet or more), nonvehicle noise associated with a campus at Henness Ridge would not be expected to have an appreciable effect on ambient noise levels at the nearest noise- sensitive receptors. Nearby areas that would see an increase in noise levels are Deer Camp Road, Elevenmile Meadow, Indian Creek, and other areas occasionally visited by students.

Impact Significance. Local, long- term, minor, adverse impact.

Operation- related Impacts of Vehicle Noise. Based on the traffic analysis prepared for this EIS and in comparison with projected traffic volumes anticipated to occur without construction of the campus at Henness Ridge, Alternative 3 would not be anticipated to result in a doubling of average- daily vehicle traffic along most area roadways, including Wawona Road and Glacier Point Road. A doubling of vehicle traffic is typically required before a noticeable increase in noise levels would be detectable to the human ear. However, given the relatively low existing volumes, operation of a campus at Henness Ridge would be anticipated to result in a doubling of vehicle traffic on Henness Ridge Road, between Wawona Road and the site, which could result in a noticeable increase in noise levels in the vicinity of this roadway segment.

Although no existing noise- sensitive land uses are located in the vicinity of the affected roadway segment, development of a campus at this location would introduce sensitive receptors to traffic noise from Wawona Road and Henness Ridge Road, including increased traffic noise from campus operations. The design for the campus would set back cabins and sleeping areas from either road, and intervening topography and vegetation would block most noise. However, vehicle noise may be noticeable depending on traffic volumes and specific locations of receptors within the new campus, but it would not be highly perceptible. In addition, perceptible increases in overall traffic noise levels at the nearest existing residential dwellings would be minimal relative to the traffic volumes and associated noise levels from other area roadways, including nearby Wawona Road.

Impact Significance. Local, long- term, minor, adverse impact.

Conclusion. Construction- related impacts would include negligible construction equipment noise. Operation- related impacts would include minor nonvehicle noise from campus activities and minor vehicle noise from increased traffic.

Impairment. Though construction- and operation- related impacts would include some adverse effects to the soundscape, the park's soundscape would not be impaired under this alternative.

ENERGY

Affected Environment

In April 1999, the U.S. Department of the Interior entered into a formal Memorandum of Understanding with the Department of Energy to promote the use of energy- efficient and renewable energy technologies and practices in the national parks. This partnership officially inaugurated the program titled "Green Energy Parks: Making the National Parks a Showcase for a Sustainable Energy Future." This initiative would help to fulfill provisions of the Energy Policy Act of 1992, which directs the use of energy- efficient building designs and equipment and the use of alternative motor fuels where practicable. The Energy Policy Act of 2005 incorporates previous Energy Policy Acts and directs the federal government to increase its renewable energy use, with a goal of using 3%, 5%, and 7.5% in incremental years through 2013. The initiative would also help fulfill the goal of Executive Order 13031, Federal Alternative Fueled Vehicle Leadership, which promotes increasing use of alternative- fueled vehicles in the federal motor vehicle fleet.

NPS *Management Policies* (2006) includes a section (Section 9.1.1.6) on sustainable energy design in the operation of park facilities. Section 9.1.1.6 states that any facility development must include improvements in energy efficiency and reduction in greenhouse gas emissions, and that such efficiencies should be achieved using solar thermal and photovoltaic applications, as well as appropriate insulations, energy- efficient lighting and appliances, and renewable energy technologies. Furthermore, this section states that energy- efficient construction projects should be used as an educational opportunity and that those built primarily for visitors must incorporate Leadership in Energy and Environmental Design (LEED) standards to achieve at least a silver rating.

NPS *Management Policies* (2006) also includes a section (Section 9.1.7) on energy management in the operation of park facilities. Section 9.1.7 states that the National Park Service shall conduct its activities in ways that use energy wisely and economically, and that encourages the implementation of alternative transportation programs and the use of bio- based and alternative fuels. It also calls for the use of renewable sources of energy and new developments in energy efficiency technology, including products from the recycling of materials and waste, where appropriate and cost- effective over the life cycle of a facility. The National Park Service shall also interpret for the public the overall resource protection benefits resulting from the efficient use of energy and shall actively educate and motivate park personnel and visitors to use sustainable practices in conserving energy. These policies are derived from the laws that have been enacted to establish and guide the administration of the national park system, including Executive Order 13423, Strengthening Federal Environmental, Energy and Transportation Management, which sets goals in energy efficiency, renewable energy, sustainable building, and water conservation.

Title 24, Part 6 of the California Code of Regulations establishes the energy efficiency standards for buildings in response to a legislative mandate to reduce the state's energy consumption. Although established in 1978, the standards have been periodically updated to allow the incorporation of new energy efficiency technologies and methods. Most recently, the 2005 Standards were adopted to respond to the state's energy crisis to reduce energy bills and increase energy delivery system reliability.

Yosemite National Park is striving to meet the direction outlined in the aforementioned management policies and Executive Orders.

This section primarily focuses on the construction and operation of the campus facilities. Vehicles to be used for campus operation (e.g., school buses) would run on gasoline; information and analysis regarding motor vehicle emissions are discussed in the Air Quality Section of the EIS.

Crane Flat Setting

Energy consumed by stationary sources at the existing environmental education campus includes wood fuel, electricity, propane, gasoline, and diesel fuel. Electricity, used for lighting and appliances, is supplied by the 75- kilovolt transformer located in the Tuolumne Grove parking lot. The environmental education campus at Crane Flat experiences power outages approximately four times per year, and are responded to by park staff. Propane, used for cooking and water heating, is stored on site in seven 495- gallon above- ground propane tanks located in the central portion of the campus. Five wood- burning stoves serve as the primary heating source for the dining hall and student dormitories. There are no natural gas lines to the environmental education campus at Crane Flat. Mobile sources, such as motor vehicles associated with the campus, consume gasoline and diesel fuel. The existing peak winter electrical and propane demand for the campus are 42 kilowatt- hours per month and 265 gallons per month, respectively. The peak electrical and propane use by students and staff housed in other locations in the park has not been quantified. In addition, energy required for the repairs and maintenance of the existing campus, including transporting materials, construction vehicles, and removal of solid waste, has also not been quantified.

Henness Ridge Setting

Currently, there is a primitive road maintenance structure at Henness Ridge. The structure is a rustic (modern) wooden shelter used to store sand for winter maintenance of Wawona Road. Both an underground electric and telephone line currently run along a corridor west of Wawona Road, between Chinquapin and Henness Ridge.

The Henness Ridge site is not connected to electricity, although there is an underground electrical line that runs diagonally through the site. This electrical line is maintained by Pacific Gas and Electric and begins at El Portal, runs through and feeds Yosemite West and Chinquapin, and stops at Badger Pass.

Environmental Consequences

Intensity Level Definitions

The analysis of energy was based on a qualitative comparison of energy use for the operation, construction, and maintenance (including repairs) of and to the campus under each alternative. The evaluation is based on available data and forecasts. For purposes of this analysis, implementation of an alternative is assumed to have an impact on energy if it results in the following:

Adverse impact:

- Increased overall per capita energy consumption
- Increased reliance on natural gas and oil

Beneficial impact:

- Decrease in overall per capita energy consumption
- Decrease reliance on natural gas and oil
- Increase use of renewable energy (e.g., photovoltaic cells, wind, geothermal)
- Incorporate energy- efficient design

Negligible: Energy use would not be affected, or effects would not be measurable.

Minor: Effects to energy use, such as increase/decrease in overall consumption, would be measurable.

Moderate: Effects to energy use, such as increase/decrease in overall consumption, would be readily apparent.

Major: Effects to energy use such as increase/decrease in overall consumption, would be readily apparent.

Impairment

Definition

Impairment analysis is not applicable to this topic.

Impacts under Alternative 1 (No- Action Alternative)

Under Alternative 1, the existing campus at Crane Flat would continue to operate as it has in the past, with no changes in energy consumption or efficiency. No construction- related impacts would occur. Operation-related impacts would include ongoing energy consumption and inefficient energy use during campus operations.

Operation- related Impacts on Energy. Inefficient energy consumption would continue to occur, particularly in the heating of poorly insulated facilities. The campus would continue to rely on wood- burning stoves as the primary heating source for the dining hall and student dormitories, propane for cooking and water heating, and the electric supply from the transformer in the Tuolumne Grove parking lot. Energy devoted to space heating of campus buildings is considered the most wasteful energy use onsite because the aging buildings are poorly insulated by modern standards and were not originally designed for their current use. In addition, the aging generator at Tuolumne Grove and the campus electrical system are also expected to require increasing attention over time. The energy used by students and staff at offsite housing is expected to continue. These inefficiencies would continue and the campus would not incorporate infrastructure for renewable energy sources, such as solar power and heat.

Impact Significance. Site-specific, long-term, moderate, adverse impact.

Conclusion. No construction-related impacts would occur. Operation-related impacts would include inefficient energy use by continued campus operations.

Impacts under Alternative 2 (Crane Flat Redevelopment)

Under Alternative 2, the campus at Crane Flat would be redeveloped, including removal of existing buildings, construction of new buildings, and increasing campus operations. Construction-related impacts would include energy use and consumption for building demolition and construction activities. Operation-related impacts would include energy use for campus operations and transportation.

Construction-related Impacts on Energy. Construction energy expenditures for the redevelopment of the campus under Alternative 2 would include both direct and indirect uses of energy. Combustion of petroleum products needed to operate construction equipment would be included in the direct energy use during the 18-month construction period. The energy consumed through mining and extraction of raw materials, manufacturing, and transportation to produce the construction materials is considered indirect energy use. Indirect energy typically represents about three-quarters of total construction energy, while direct energy represents about one-quarter of the total construction energy (Hannon et al. 1978). Though construction energy would be consumed only during the construction period, it would represent the irreversible consumption of finite natural energy resources.

Construction activities under Alternative 2 would consume fuel and electricity, along with indirect energy for materials used in constructing development components. Construction equipment, including haul trucks and vehicles onsite, is expected to consume a majority of the energy resources. Electricity would be used by construction equipment, such as welding machines and power tools. Energy consumed by construction power equipment would be relatively minimal.

The amount of energy consumed each day would vary depending on a number of factors, such as the number and types of equipment in operation on a given day, usage rates, the number of construction workers needed, the number of haul trips, and trip length. Construction energy consumption would occur for the duration of the construction period and therefore would not be an ongoing drain on finite natural resources. Construction energy consumption would primarily be in the form of fuel, would not have a significant effect on the energy resources of the park, and would not require new infrastructure. The design plan under Alternative 2 includes measures that would reduce construction energy expenditure through the use of recycled materials. BMPs for air quality and noise would help reduce fuel consumption by construction equipment (e.g., ensuring all construction equipment is properly tuned and maintained, turning off equipment when not in use). Furthermore, materials removed as part of the demolition of existing campus facilities would be sorted and salvaged for reuse or recycling.

Impact Significance. Site-specific, short-term, negligible, adverse impact.

Operation- related Impacts on Energy. The peak winter electrical and propane demand for the reconstructed campus is anticipated to be 140 kilowatt- hours per day and 638 gallons per month. Though the overall quantity of energy consumed by the Crane Flat campus would increase, the efficiency and sustainability of energy consumption would increase considerably. In addition, the new campus would have increased capacity (more than double) to house all students onsite, thus decreasing the need for offsite accommodations. Under Alternative 2, the campus would receive its electricity from an onsite power plant with a cogeneration system that uses wasted heat from electrical generators to heat domestic water as well as provide space heating for the dining hall. Water use would be minimized through an onsite wastewater treatment plant that would recycle water from plumbing fixtures for nonpotable reuse in toilets. This system would significantly reduce potable water consumption and eliminate any need for offsite domestic wastewater treatment.

Under Alternative 2, most existing structures on the campus would be replaced with new facilities designed in accordance with the NPS *Guiding Principles of Sustainable Design* (1993b). These principles include the orientation of buildings to maximize sun exposure for heat gain and to minimize the effects of prevailing winds, design that incorporates the use of natural ventilation, entry vestibules to reduce heat loss, energy-efficient lighting, and the installation of energy- and water- efficient features and utilities. Design of the new facilities would also incorporate insulation improvements, including sloped roofs that allow snow build- up in the winter months to increase roof insulation, thus improving heating efficiency. Furthermore, the reconstruction of the campus would include all elements outlined in Chapter 2, which include energy-efficient construction design, sustainability and "green" technology, lighting, site drainage, water conservation, wastewater management, and energy conservation.

Impact Significance. Site- specific, long- term, minor, beneficial impact.

Conclusion. Construction- related impacts, including demolition, would include some fossil- fuel based energy use by equipment and vehicles. Although operation- related impacts would include an increase of energy consumption, it would include much more energy- efficient technologies, resulting in a decrease in per capita energy consumption.

Impacts under Alternative 3 (Henness Ridge Center)

Under Alternative 3, a new campus would be developed at Henness Ridge, the Crane Flat campus would be restored, and campus operations would be moved to the new location. As part of the design, energy- efficient uses would be incorporated into heating and electricity to conserve and offset energy use. Construction-related impacts would include energy use and consumption for building demolition and construction activities. Restoration- related impacts would include energy use and consumption for building demolition, and habitat restoration activities. Operation- related impacts would include energy use for campus operations and transportation.

Construction- related Impacts on Energy. Construction activities at Henness Ridge would require both direct and indirect uses of energy, similar to those described under Alternative 2. These energy uses would be required for the duration of construction and would not constitute a long- term demand for energy.

Impact Significance. Site- specific, short- term, negligible, adverse impact.

Restoration- related Impacts on Energy. Restoration activities at Crane Flat would require both direct and indirect uses of energy, very similar to those described under the construction in Alternative 2. Heavy equipment would be used to restore and enhance habitat for wildlife, restore native vegetation and hydrologic function, and remove visible evidence of the campus. Building demolition would include removing structures, footings, foundations, utilities, septic systems and associated plumbing, and the parking lot. Bobcats with ripping tools would be used to decompact soil in the parking areas and other heavily compacted areas. Trucks would be used to haul materials, such as imported fill material and old asphalt that were used to build the campus, from the site. Heavy equipment would be used to restore the topography and surface water drainages, where the landscape was previously modified. Equipment would be used to remove invasive species and to plant native vegetation. Construction equipment would be used to install interpretive exhibits at the Tuolumne Grove visitor use area, and to construct a split- rail fence adjacent to the meadow. These energy uses would be required for the duration of restoration and would not constitute a long- term demand for energy.

Impact Significance. Site- specific, short- term, negligible, adverse impact.

Operation- related Impacts on Energy. The peak winter electrical, propane, and wood demand for a new campus at Henness Ridge is anticipated to be 343 kilowatt- hours per day, 250 gallons of propane per month, and 6 cords per winter. Though the overall quantity of energy consumed by the Henness Ridge campus would increase compared to the Crane Flat campus, the efficiency and sustainability of energy consumption would increase considerably. In addition, compared with the Crane Flat campus, the campus at Henness Ridge would have more than triple the capacity to house students onsite, thus decreasing the need for offsite housing.

Under Alternative 3, the campus would offset electricity use from the existing grid with onsite and possibly offsite renewable energy sources. The Henness Ridge campus would include a PV solar array system and geothermal heating system plus possible additional offsite solar offsets. The energy- efficient design would allow for most of the electricity and some of the water heating to be provided by photovoltaics and geothermal, respectively, if the buildings were to be located in the areas with solar access and geothermal heat pump systems. Water use would be minimized through an onsite wastewater treatment plant that would recycle water from plumbing fixtures for nonpotable reuse in toilets. This system would significantly reduce potable water consumption and eliminate any need for offsite domestic wastewater treatment.

Under Alternative 3, new facilities would be designed and constructed in accordance with the NPS *Guiding Principles of Sustainable Design* (1993b). These principles include the orientation of buildings to maximize sun exposure for heat gain and to minimize the effects of prevailing winds, design that incorporates the use of natural ventilation, entry vestibules to reduce heat loss, energy- efficient lighting, and the installation of energy- and water- efficient features and utilities. Design of the new campus would also incorporate proper insulation, including sloped roofs that allow snow buildup in the winter months to increase roof insulation, thus improving heating efficiency. Furthermore, net- zero energy use and maximum LEED rating (with at least a silver rating) is the goal under this alternative, and to meet this standard, the construction of the new campus would include all elements outlined in Chapter 2, which include construction design, sustainability and “green” technology, lighting, site drainage, water conservation, wastewater management, energy conservation.

Impact Significance. Site- specific, long- term, minor to moderate, beneficial impact.

Conclusion. Construction- related and restoration- related impacts would include energy use by equipment and vehicles. Operation- related impacts would include highly efficient energy use that may approach “net- zero” and that is based on green technologies, including solar power. The campus under Alternative 3 would meet LEED standards, thus conforming with NPS *Management Policies* (2006).

WILDERNESS

Affected Environment

The designated Yosemite Wilderness of Yosemite National Park offers an escape from human- made structures, crowds, artificial light, and noise, and allows visitors to experience solitude, natural quiet, and spectacular scenery. The vast Wilderness also allows visitors to explore and discover the incredible natural beauty of the many geologic features, rivers, streams, lakes, and many species of plants and animals. Visitors find that they can hike for considerable lengths of time without encountering other people along the trail. The remote areas of the Wilderness provide outstanding opportunities for solitude and a primitive and unconfined type of recreation. This is the basis of a Wilderness experience.

The Yosemite Wilderness was established by the California Wilderness Act of 1984. Of Yosemite National Park's 761,266 total acres, 704,624 acres (94.2%) have been designated Wilderness, and another 927 acres (0.1%) are potential Wilderness additions. The Yosemite Wilderness occurs in two large blocks north and south of Tioga Road near the Crane Flat area. The meadows south of the existing environmental education campus and woodland areas to the north and east of the campus are included within the Yosemite Wilderness. However, the campus and Tuolumne Grove are not included within Yosemite Wilderness. At Henness Ridge, Wilderness is located in one continuous tract across Wawona Road to the east. The NPS staff serving the Wilderness includes patrol, public contact, and administrative staff. Wilderness employees work primarily to provide service to Wilderness visitors and to preserve wilderness character.

The Yosemite Wilderness is generally accessed by the almost 750 miles of marked and maintained trails. Visitor day use is unregulated, but overnight use and access to the Wilderness is controlled by trailhead quotas implemented through a Wilderness permit system administered by the National Park Service. Trailhead quotas have been established to reduce resource impacts and to increase opportunities for solitude. Compared with the developed areas, visitor use is significantly less. YI programs currently use Wilderness trails and would continue to do so under all the alternatives.

Camping is generally allowed anywhere in the Wilderness, provided it is at least 100 feet from any water body. Camping is discouraged in sensitive areas (i.e., meadows and other areas with fragile vegetation). In some areas there are no- camping or no- fire zones. No- camping zones include all areas within 1 mile of public access roads and within 4 trail- miles of Yosemite Valley, Tuolumne Meadows, Wawona, and Hetch Hetchy. Campfires are generally allowed below 9,600 feet, although restrictions exist in certain areas. Toilets have been installed in most designated campgrounds, and food lockers have been installed at all Wilderness trailheads. The control of human waste is among the most critical management issues in the Wilderness. Other practices designed to minimize or eliminate impact are either recommended or required.

The Yosemite Wilderness has 69 trailheads starting within the park, and 48 trailheads on U.S. Forest Service (USFS) lands, that access almost 750 miles of marked trails. These trails are maintained by the National Park Service with crews augmented by the California Conservation Corps. NPS rangers and volunteers patrol the Wilderness area on foot, skis, or horseback. All marked and maintained Wilderness trails are open to private or commercial stock, with minor exceptions. Stock are generally not allowed more than 0.25 mile off marked and maintained trails, and then only for feeding and watering. Hikers in groups of eight persons or less are allowed to use cross- county routes and are encouraged to practice minimum- impact techniques.

In addition to designated trails and access points, volunteer or social trails into natural areas are common near Crane Flat and Henness Ridge. The development of volunteer or social trails, those that are created by users and not part of a formal system, continues to be problematic. These trails lead to trampling of vegetation as well as erosion, which can cause more significant biological and water quality impacts.

Crane Flat Setting

At Crane Flat, designated Wilderness is located on either side of Tioga Road. Nearby trailheads that are open year- round include pulloffs on Tioga Road, Big Oak Flat Road, Evergreen Road, and at Merced Grove. Wilderness access is also available at the Tamarack Flat Campground via Tioga Road, which is closed from November to May due to winter conditions and is managed as Wilderness during this time. Student groups occasionally visit Wilderness.

The areas north and west of Crane Flat and south of Tioga Road include some social trails. There is a 4- to 5- foot- wide social trail that parallels a small tributary and connects the environmental education campus to Old Big Oak Flat Road.

Henness Ridge Setting

Near Henness Ridge, designated Wilderness is located across the Wawona Road to the east and on either side of the Glacier Point Road. The nearest Wilderness access is located south of the Chinquapin junction near Henness Ridge at the Deer Camp Road trailhead. Other access points are located along the Glacier Point Road and along Wawona Road. At Henness Ridge, social trails are common between Yosemite West and the Deer Park trailhead on Wawona Road.

A 64- acre parcel of land (Old Glacier Point Road) near Henness Ridge along Indian Creek east of Wawona Road was previously evaluated for wilderness and proposed to Congress as a potential Wilderness addition. These impediments would be removed (while maintaining the historic roadbed) under Alternative 3 in conjunction with water utility improvements for the campus (Figure 3- 8). The California Wilderness Act of 1984, Public Law 98- 425, states the following in regards to potential wilderness additions in Yosemite National Park:

> **National Park Wilderness**
>
> SECTION 106. The following lands are hereby designated as wilderness in accordance with section 3(c) of the Wilderness Act (78 Stat. 890; 16 U.S.C. 1132(c)) and shall be administered by the Secretary of the Interior in accordance with the applicable provisions of the Wilderness Act. (1) Yosemite National Park Wilderness, comprising approximately six hundred and seventy- seven thousand six hundred acres, and potential wilderness additions comprising approximately three thousand five hundred and fifty acres, as generally depicted on a map entitled “Wilderness Plan, Yosemite National Park, California,” numbered 104- 20, 003- E dated July 1980, and shall be known as the Yosemite Wilderness;
>
> **Cessation of Certain Uses**
>
> SECTION 108. Any lands (in section 106 of this title) which represent potential wilderness additions upon publication in the Federal Register of a notice by the Secretary of the Interior that all uses thereon prohibited by the Wilderness Act have ceased, shall thereby be designated wilderness. Lands designated as potential wilderness additions shall be managed by the Secretary insofar as practicable as wilderness until such time as said lands are designated as wilderness.

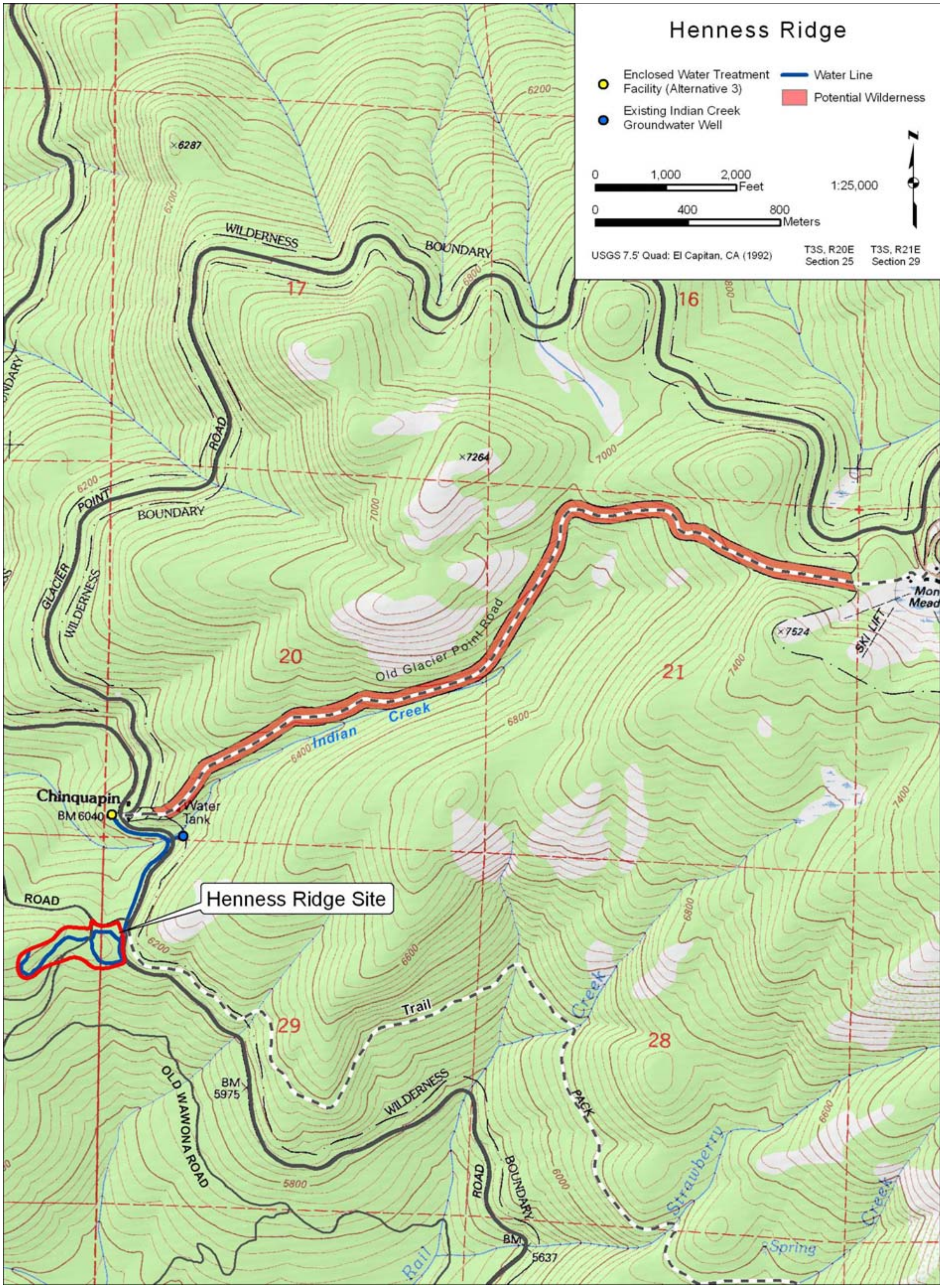

Figure 3-8. Potential Wilderness near Henness Ridge

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Environmental Consequences

Intensity Level Definitions

Impacts to Wilderness were evaluated using the process described in the introduction to this chapter. Impact threshold definitions for Wilderness are as follows:

Negligible: Wilderness would not be affected, or effects would not be measurable. Any effects to Wilderness would be slight and short- term.

Minor: Effects to Wilderness, such as increase in trail use, would be detectable. If mitigation is needed to offset adverse effects, it would be relatively simple to implement.

Moderate: Effects to Wilderness would be readily apparent. Mitigation would probably be necessary to offset adverse effects.

Major: Effects to Wilderness would be readily apparent and would substantially change the characteristics of the Yosemite Wilderness. Extensive mitigation would probably be necessary to offset adverse effects, and its success could not be guaranteed.

Impairment

Definition

A permanent adverse change would occur to Wilderness in Yosemite National Park, affecting the resource to the point that the park's mission could not be fulfilled and enjoyment by future generations of Wilderness would be precluded.

Impacts under Alternative 1 (No- Action Alternative)

Under the No- Action Alternative, the campus at Crane Flat would continue to operate as it has in the past with no new construction or expansion of uses. No construction- related impacts would occur. Operation- related impacts would be limited to campus activities that occur in Wilderness.

Operation- related Impacts on Wilderness. Day- to- day educational activities that include hiking, snowshoeing, or skiing in Wilderness would continue around Crane Flat and in Yosemite Valley.

Impact Significance. Local, long- term, minor to moderate, adverse impact.

Conclusion. No construction- related impacts would occur. Operation- related impacts would include minimal disturbance to Wilderness from ongoing campus activities.

Impairment. Because there would be no change to the natural and cultural integrity of Yosemite National Park under Alternative 1, Wilderness in Yosemite National Park would not be impaired.

Impacts under Alternative 2 (Crane Flat Redevelopment)

Under Alternative 2, the campus at Crane Flat would be redeveloped, and campus operations would be expanded through an increase in the number of students using the campus. Construction activities would occur, but they would be limited to the existing development footprint and a slightly expanded area and would not intrude on the Wilderness boundary. No construction- related impacts would occur. Operation- related impacts would include increased use of the Wilderness during campus activities.

Operation- related Impacts on Wilderness. YI groups may continue to disturb other hikers, skiers, and horseback riders seeking solitude and quiet in the backcountry, though student groups are small and the Yosemite Institute teaches backcountry ethics to its groups. Impacts are expected to be minor because the total number of hikers, skiers, and horseback riders entering designated Wilderness at trailheads near Crane Flat would continue to be considerably lower than permitted Wilderness use in areas such as Yosemite Valley and Tuolumne Meadows.

Impact Significance. Local, long- term, minor, adverse impact.

Conclusion. No construction- related impacts would occur. Operation- related impacts would include minor disturbance to Wilderness from ongoing campus activities.

Impairment. Because there would be no change to the natural and cultural integrity of Yosemite National Park under Alternative 2, Wilderness in Yosemite National Park would not be impaired.

Impacts under Alternative 3 (Henness Ridge Center)

Under Alternative 3, a new campus would be developed at Henness Ridge, which would include moving program activities to recreational areas in the vicinity of Henness Ridge. The new campus would also include water utility improvements that would result in the designation of approximately 64 acres of new Wilderness after closure of the utility road along Indian Creek. Campus development at Henness Ridge would not intrude on the designated Wilderness in the area; thus, no construction- related impacts would occur. Operation- related impacts would result from campus activities occurring in the nearby Wilderness areas.

Operation- related Impacts on Wilderness. The introduction of campus activities in the vicinity of Henness Ridge could result in new disturbances to visitors using the nearby Wilderness, especially if YI groups disturb other hikers, skiers, and horseback riders seeking solitude and quiet in the backcountry. Wilderness near Henness Ridge is not heavily used, however, and as mentioned previously, student groups are small (15 or less) and YI teaches backcountry ethics to its groups.

A 64- acre parcel of land (Glacier Point Road) near Henness Ridge along Indian Creek east of Wawona Road was previously evaluated for Wilderness and proposed as a potential Wilderness addition. Under Alternative 3, the historic roadbed would be maintained and the impediments (i.e., buildings related to the out- dated water system but not the water tank) would be removed. After restoration and revegetation the area would be added to the current park Wilderness, resulting in a beneficial impact to Wilderness the continuity of habitat. This corridor along Indian Creek is important to wildlife, particularly Pacific fisher and owls.

Impact Significance. Local, long- term, minor, adverse impact. Local, long- term, moderate, beneficial impact.

Conclusion. No construction- related impacts would occur. Operation- related impacts would include some disturbance to Wilderness from ongoing campus activities.

Impairment. Because there would be no change to the natural and cultural integrity of Yosemite National Park under Alternative 3, Wilderness in Yosemite National Park would not be impaired.

SOCIO- CULTURAL RESOURCES

HISTORIC PROPERTIES

NHPA Methods for Assessing Effect (Impact Analysis)

Pursuant to DO 12 Sections 2.14(6) (3), 6.2 F, and 6.3 F and Appendix 3; 40 CFR 1508.7, 1508.8, and 1508.27; and 36 CFR 800.8, impact intensity, duration, context, and type as they relate to historic properties are determined with the criteria established in 36 CFR Part 800. When the impact of an action results in an alteration to the characteristics of a cultural resource that qualifies it for inclusion on the National Register of Historic Places (NRHP) as a historic property, the action is considered to have an adverse effect under Section 106 of the National Historic Preservation Act (NHPA). NHPA defines three types of effects can be considered pursuant to 36 CFR 800.5 as applied to historic properties. These include no effect, no adverse effect, and adverse effect.

- **No Historic Properties Effected.** A "no historic properties effect" determination indicates that no historic properties are in the area of potential effects (APE) or that there are historic properties in the APE, but the undertaking would not alter the characteristics that qualify it for inclusion in or eligibility for the NRHP.
- **No Adverse Effect.** A no adverse effect determination indicates that there would be an effect on the historic property by the undertaking, but the affect does not meet the criteria in 36 CFR 800.5 (a)(1) and would not alter characteristics that make it eligible for listing on the NRHP in a manner that would diminish the integrity of the historic property. Operations, maintenance, rehabilitation, restoration, and preservation actions also fall under this no adverse effect category.
- **Adverse Effect.** An adverse effect indicates that the undertaking would alter, directly or indirectly, the integrity of design, setting, materials and workmanship, feeling, or association characteristics of the property, making it eligible for listing on the NRHP. An adverse effect may be resolved in accordance with Stipulation VIII of the park's 1999 PA among the National Park Service, the California State Historic Preservation Officer (SHPO), and the Advisory Council on Historic Preservation (ACHP) regarding planning, design, construction, operations, and maintenance of Yosemite National Park (NPS 1999). Alternatively, adverse effects can be resolved by developing a three- party memorandum or PA with the SHPO and the ACHP, in consultation with the associated American Indian tribal governments, other consulting parties and the public (36 CFR 800.6).

NEPA Significant Impact

For purposes of NEPA and *DO- 12, Conservation, Planning, Environmental Impact Analysis, and Decision- making*, an impact to a historic property would be considered significant when an adverse effect cannot be resolved by agreement among the SHPO, ACHP, American Indian tribal governments, other consulting and interested parties, and the public. The resolution must be documented in a memorandum or PA or the NEPA decision document.

ARCHEOLOGY

Affected Environment

To date, at least 10 percent of Yosemite National Park lands have been inventoried for archeological resources, and more than 1,700 archeological sites have been documented. Most of the inventories focused on lower- elevation developed areas and road corridors; however, some Wilderness areas have also been surveyed. In most cases, inventories have been conducted in support of park development actions as part of the environmental and historic preservation compliance processes. The parkwide archeological research design developed by Hull and Moratto (1999), titled *Archeological Synthesis and Research Design for Yosemite National Park, California*, provides guidance for assessing the research potential of these sites. This document is the most recent comprehensive overview of archeological resources and their informational value.

Prehistoric archeological sites within Yosemite National Park include milling stations (granite boulders with mortar cups or milling slicks, the most common feature documented to date), artifact caches and scatters (including obsidian waste flakes, obsidian and ground stone tools, soapstone vessel fragments, and dietary faunal remains), midden soils, rock shelters, pictograph panels, human burials, house floors, fire hearths, and rock alignments. Historical archeological sites include refuse deposits, building foundations, privy pits, utilities, human burials, and landscape features such as ditches, roads, rock alignments, non- native plants, and trails. Individual sites vary by type, size, depth, complexity, length of occupation, variety of remains, and potential to yield important scientific information.

Archeological resources in the Crane Flat and Henness Ridge locales include prehistoric and well as historic sites. For prehistoric sites, James Bennyhoff of the University of California at Berkeley presented the first cultural chronology for the Crane Flat area based on his excavations conducted in the early 1950s (Bennyhoff 1956). In brief, Bennyhoff's proposed chronology consisted of three distinct complexes/phases:

- Crane Flat (1000 B.C. to A.D. 500), characterized by heavy projectile points indicative of dart and atlatl use and by the presence of manos and milling stones for seed processing;
- Tamarack (A.D. 500 to A.D. 1200), characterized by a shift to small projectile points indicative of bow and arrow use and bedrock mortars and cobble pestles for seed processing; and
- Mariposa (A.D. 1200 to A.D. 1850), characterized by increasingly small arrow points and representative of the protohistoric Sierra Miwok.

A significant quantity of data applicable to the reassessment of the archeology of the Yosemite region has been produced. These data sets include: cultural resource management studies within the Park; overviews of the southern and central Sierra; and, more extensive excavations in Wawona, Mariposa Grove, Glacier Point Road, Dana Meadows, Tuolumne Meadows, Tamarack Flat, Crane Flat, Yosemite Valley and El Portal. The new data have allowed for a reassessment of the cultural sequences for the southern and central Sierra. For the Yosemite region, these data have provided an opportunity for a more thorough evaluation of Bennyhoff's (1956) Yosemite chronology. A number of instances have been noted where Bennyhoff's sequence failed to correlate with the current data. The three primary divergences are the relative abundance of data that indicate significant human occupation of the region prior to Crane Flat occupation (i.e., before 1000 BC), the complexity of culture change indicated by ethnographies of the historic period, and the complexity of prehistoric culture change indicated by the archeological record.

Taking into account these discrepancies as well as other problems with the original cultural sequence, Hull and Moratto (1999) proposed a new cultural chronology. Their chronology identified a pre–Crane Flat Phase (named El Portal) and created finer temporal resolution within the earlier phase and stage chronologies. Hull and Moratto (1999:181) cautioned that "the culture history...must be viewed as tentative and subject to revision as archeological research continues." The least well- defined portion of Hull and Moratto's chronology was the historic period following the Gold Rush, identified as the Tenaya Complex. Phases identified by Moratto and Hull (199:182) include the El Portal (7500- 6000 B.C.), Merced, Clyde and other unidentified Phases (6000- 3500 B.C.), tentative Wawona (3500- 1200 B.C.), Crane Flat and possibly Cowhorn (1200 B.C.- A.D. 650), Tamarack (A.D. 650- 1350), Mariposa, Klondike (A.D. 1350- 1800), Yosemite (A.D. 1800- 1847), and Tenaya (A.D. 1848).

Historical archeology is closely tied to the development of Yosemite, beginning with the vestiges from early explorers and continuing through National Park Service management of the park. In addition to Anglo-American historical use of Yosemite, a subset of historical archeology represented at the park includes historical Native American properties. Hull and Moratto (1999:507- 510) present an integrated list of historical archeological site types found in Yosemite that include transportation, exploration and survey, historical Native American, hunting/trapping, residential, water diversion/use, mine and quarry, logging, ranching/herding/farming, environmental management, tourism, park operations and administrative, and other types such as cemetaries or locations. Hull and Moratto (1999:511- 531) then developed Yosemite-specific themes oriented to historical archeology. Themes relevant to the YI project include exploration and surveying, transportation, national resource management (e.g., Civilian Conservation Corps, CCC), and industrial (e.g., logging).

During the nineteenth century, the Yosemite area and its natural resources were used and exploited by individuals for private gain and included mainly mining, herding, logging, and tourism. The progression of such development was particularly evident in the transportation and lodging infrastructure. At the end of the nineteenth century, the area became the first major piece of federal land to be set aside for preservation purposes as a result of the movement to preserve the natural wonders of Yosemite Valley and the groves of "big trees" that surrounded it. This resulted in the formation of the Yosemite Grant in 1864 that became a national park in 1890. The creation of this park and its policies on the nature of acceptable land use fostered tensions between private entrepreneurs, who used public lands for their own means, and state and federal governments. These tensions resulted in a number of lawsuits that tested the rights of private individuals versus the federal government. Ultimately, the federal government prevailed in preserving Yosemite Valley and the surrounding lands for the public. The preservation of this area reduced the environmental impacts caused by private enterprises, such as stock grazing, logging, and mining, within and adjacent to the Park.

The historical archeology of Crane Flat and Henness Ridge is strongly tied to that of Yosemite National Park. To some degree, it exhibits a similar progression from private development to eventual transfer to public management. Early logging, transportation, and lodging property types are also found within Crane Flat. Crane Flat is situated along the way to the Valley rather than within it; consequently, the timing of its development and its transfer to the public trust differed from the Valley. Since becoming a part of Yosemite National Park, Crane Flat has served as a base for many of the park improvement projects, including a Ranger Station, a CCC camp, and later a Blister Rust Camp operated by the National Park Service. Since 1973, the area has served as a base for the Yosemite Institute, which provides outdoor education to the public.

Historical archeology at Henness Ridge has a history of transfer to the park somewhat similar to that of Crane Flat. Henness Ridge is along an early transportation corridor leading to Yosemite Valley, and was also one of the major haul routes for logging in the area. The proposed Henness Ridge Campus also contains the remains of a CCC Blister Rust Camp.

Crane Flat

The 5- acre environmental education campus area has been the subject of several archeological resource studies, including survey, monitoring, and limited site testing, within the last decade (Jackson 2001; Pacific Legacy 2003, 2006; Russell 2001; Ryan 1999a, 1999b). Portions of CA- MRP- 1512H/CA- TUO- 4240H lie within the Crane Flat Campus. The site is composed of three distinct loci: the Way Station Locus, which encompasses the remains of the Gobin Hotel and Hurst Saloon (1860s to 1900s); the Ranger Station Locus (1915 to 1940); and the CCC Locus (1933 to 1942) (Pacific Legacy 2006). Components of CA- MRP- 1512H/CA- TUO- 4240H within the existing Crane Flat Campus include the Ranger Station and CCC loci.

The archeological investigation by Pacific Legacy (2006) determined that one component of CA- MRP- 1512H/CA- TUO- 4240H possessed sufficient significance and integrity to be considered eligible for listing on the National Register of Historic Places (NRHP). This component is the archeological deposit associated with the Hurst Saloon (1870s to 1890). Pacific Legacy (2006) recommended that the Hurst Saloon at the Way Station locus possesses material remains in sufficient quantity, quality, and context to address the research topic of “rural consumer research” identified by Hull and Moratto (1999:516- 521) as significant for archeological research in Yosemite National Park. The remains of the Hurst Saloon and Gobin Hotel within the Way Station Locus of CA- MRP- 1512H/CA- TUO- 4240H lie outside of the Crane Flat Campus Area of Potential Effect (APE).

Within the existing Crane Flat Campus, Pacific Legacy (2006) recommended that two components of CA- MRP- 1512H/CA- TUO- 4240H do not retain sufficient integrity or fail to possess the requisite significance for NRHP eligibility. These components include: 1) the extant foundation of the ranger patrol cabin and the archeological deposits associated with the ranger patrol cabin at the Ranger Station Locus; and 2) the archeological deposits and features at the CCC Locus. Therefore, no historic properties have been identified within the existing Crane Flat Campus APE.

Henness Ridge

The Henness Ridge site has been surveyed for the presence of archeological and historical resources as part of six studies conducted since 1998 (Depascale 2007; Gassaway 1998; Hansen and Kirn 1990; Keefe 1998; Peabody and Kelly 2008; Gavette and Jackson 2010). Two historical resources and one multi- component archeological site have been recorded. The historical resources include remnants of the Yosemite Lumber Company railroad grade (CA- MRP- 1485H) and the Old Wawona Road (P- 22- 000296) that connected Wawona with Yosemite Valley and was first opened in 1875. The Old Wawona Road was surveyed by Hull and Hale in 1994 and 1995 (cited in Sandy and Dubarton 2007:62). Hull and Hale concluded that the roadway was not eligible for listing on the NRHP under criterion D (has yielded, or may be likely to yield, information important to prehistory or history) (cited in Sandy and Dubarton 2007:62); however it could be considered eligible under other criteria. The site record for the Old Wawona Road indicates that no features other than the roadbed were noted within the Henness Ridge Campus site APE (Hale and Flint 1995).

A portion of the mainline and branchline 1 (Bevill and Kelly 2001) of the Yosemite Lumber Company Railroad Grade (CA- MRP- 1485H) is within the construction footprint of the Henness Ridge Campus. The rails and ties of the Yosemite Lumber Company railroad have been removed, but the earthworks, including through- cuts and a rock and earth fill causeway, are extant and are currently used as a dirt road (Keefe 1998). A survey of the railway, completed in 2001 (Bevill and Kelly 2001), recorded 6 miles of mainline, 13 miles of branchline, and 2 miles of short spurline within the south side system extending up to and beyond Henness Ridge. The system was in operation from 1912 to 1923. Bevill and Kelley recommended that both the north- and south- side systems of the Yosemite Lumber Company and Yosemite Sugar Pine Company be recorded as historic districts (Bevill and Kelly 2001:52). They also recommended that contributing and non- contributing elements of the district be identified for management purposes.

The multi- component site (CA- MRP- 1484/H) includes a prehistoric obsidian biface and two flakes, and the remains of a CCC blister rust removal camp. Features and artifacts discovered during recent testing and evaluation of the site (Nilsson 2009) confirmed the presence of the CCC camp, and recommended that the initial assessment (Peabody and Kelly 2008) that the multi- component site is not eligible for listing on the NRHP under any of the NRHP criteria be maintained.

Archaeological site (CA- MRP- 1525H) is a 2.5 mile segment of the Old Glacier Point Road, constructed under the direction of Washburn, beginning in 1882. This reconstruction of the bridle trail from Chinquapin to Glacier Point as a 16- foot wide wagon road, allowed vehicle access to Glacier Point. In 2000, it was found to eligible for the National Register of Historic Places under Criteria A, B and C by Nave (2000) as indicated in Sandy and DuBarton (2007). In addition, Nave recommended that the remaining intact portions of the Old Glacier Point Road be recorded and added and that the entire route be nominated as the Old Glacier Point Road Historic District. The Old Glacier Point Road, which had grades of up to 20 percent along its 14 mile route, was reconstructed following a new alignment for the modern road in the 1930s (NPS; 2007d).

Environmental Consequences

Impacts and Determination of Effect under Alternative 1 (No- Action Alternative)

Operation- related Impacts on Archeological Resources. Under Alternative 1, the No- Action Alternative, no specific actions would be taken to change existing conditions. Under this Alternative, no impacts would occur as no historic properties have been identified within the APE (existing Crane Flat Campus).

Activities associated with current use of the Crane Flat Campus would not significantly alter, directly or indirectly, any of the characteristics of Hurst Saloon locus at CA- MRP- 1512H/CA- TUO- 4240H that qualify the property for inclusion in the NRHP. This locus is located outside of the APE (existing footprint of the Crane Flat Campus).

Impact Significance and Determination of Effect. Under Alternative 1, archeological no historic properties would be affected by continued use and operation of the Crane Flat Campus.

Conclusion. Under the No- Action Alternative, the campus at Crane Flat would remain in its current condition, and campus operations would continue as they have in the past. Continued operation of the existing environmental education campus under Alternative 1 would result in no effect to archeological historic properties,

Impairment. Because there would be no change to the natural and cultural integrity of Yosemite National Park under Alternative 1, archeological resources in Yosemite National Park would not be impaired.

Impacts and Determination of Effect under Alternative 2 (Crane Flat Redevelopment)

Construction- related Impacts on Archeological Resources. Construction activities to redevelop the campus would have no impacts to archeological historic properties.

Impact Significance and Determination of Effect. No archeological historic properties will be affected by redevelopment of the Crane Flat Campus.

Operation-related Impacts on Archeological Resources. Operations-related activities for the redeveloped Crane Flat campus would have no impacts to archeological historic properties.

Conclusion. Under Alternative 2, the Yosemite Institute would redevelop the Crane Flat campus, resulting in a slightly larger development footprint. There would be no archeological historic properties affected under Alternative 2.

Impairment. Because there would be no change to the natural and cultural integrity of Yosemite National Park under Alternative 2, archeological resources in Yosemite National Park would not be impaired.

Impacts and Determination of Effect under Alternative 3 (Henness Ridge Center and Crane Flat Restoration)

Construction-related Impacts on Archeological Resources. Construction activities to develop a new campus at Henness Ridge has the potential to affect two historic properties located within the construction footprint of the Henness Ridge campus: the Yosemite Lumber Company Railroad grade (CA-MRP-1485H) and the Old Wawona Road (P-22-000296), both of which are considered eligible for listing on the NRHP. The potential for an adverse effect on historic properties under Section 106 of the NHPA would be mitigated by project design to avoid impacts.

Old Glacier Point Road (CA-MRP-1525H) is currently used as a service road by NPS staff and as a trail by the public. Under Alternative 3, this unpaved road would be converted to a trail only and 64 acres of designated Wilderness. This action would not include ground disturbance, or any structural modifications. There would be no adverse effect by implementing the 1999 PA.

Impact Significance and Determination of Effect. Construction of the Henness Ridge Campus would have no adverse effect on the Yosemite Lumber Company Railroad grade (CA-MRP-1485H) and a segment of the Old Wawona Road (P-22-000296) since project design will avoid adverse effects.

Operation-related Impacts on Archeological Resources. Use of the new campus at Henness Ridge by visitors and routine maintenance of facilities has the potential to affect the Yosemite Lumber Company Railroad grade (CA-MRP-1485H) and the Old Wawona Road (P-22-000296) since they are considered historic properties. There would be no adverse effect by implementing the 1999 PA.

Impact Significance and Determination of Effect. Construction of the Henness Ridge Campus would have no adverse effect on CA-MRP-1485H and a segment of the Old Wawona Road (P-22-000296) with appropriate interpretive material.

Restoration-related Impacts on Archeological Resources. Under Alternative 3, YI operations and activities would discontinue at the Crane Flat location, and the Crane Flat campus site would be restored to essentially natural conditions, in turn for developing a campus at Henness Ridge. Restoration would result in removing visible evidence of the campus while still preserving some historic elements and providing interpretation of the CCC camp. Restoration activities would have no impacts since no archeological historic properties have been identified within the APE (existing Crane Flat Campus). The remains of the Hurst Saloon, considered a historic property, are located outside of the APE (campus restoration area) and will be avoided. Activities would not significantly alter, directly or indirectly, any of the characteristics of this historic property that qualify the property for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Thus, no archeological historic properties would be affected. Restoration of the Crane Flat Campus would result in a "no archeological historic properties affected" determination for purposes of Section 106 compliance.

Impact Significance and Determination of Effect. Restoration of the Crane Flat Campus would have no effect on archeological historic properties.

Conclusion. Under Alternative 3, a new campus would be developed at Henness Ridge, and campus activities would cease at Crane Flat. Construction of the Henness Ridge Campus would have no adverse effect on the Yosemite Lumber Company Railroad grade (CA- MRP- 1485H) and a segment of the Old Wawona Road (P-22- 000296) since appropriate mitigation measures would be applied. Conversion of a portion of Old Glacier Point Road (CA- MRP- 1525H) would have no adverse effect on historic properties, pursuant to the 1999 PA. Restoration of the Crane Flat campus would have no effect on archeological historic properties.

Impairment. Because there would be no change to the natural and cultural integrity of Yosemite National Park under Alternative 3, archeological resources in Yosemite National Park would not be impaired.

HISTORIC STRUCTURES, BUILDINGS, AND CULTURAL LANDSCAPES

Affected Environment

Yosemite National Park is regarded as the first unit of the later designated national park system (Kirk and Palmer 2004; Greene 1987). Establishment of Yosemite also constituted the establishment of the first state park and was thus the beginning not only of the California State Park System but of state parks nationwide (Greene 1987). In the fall of 1890, Acts of Congress established Yosemite National Park, Sequoia, and General Grant National Parks. In 1892, the establishment of the Sierra Club had a significant impact on the success and formation of Yosemite National Park as well as other federal parks. In the early 1900s, a consortium of landscape architects, architects, and engineers led by Sierra Club President John Muir developed a cohesive landscape design that fulfilled the demands for park development yet preserved the noticeable natural qualities for which Yosemite National Park and other parks had been designated (McClelland 1993). The intention was to maintain the natural quality of the park as best as possible while at the same time providing facilities for lodging, camping, and supplies to the tourists. These concepts formed the foundation of future park policy and evolved into the creation of park development outlines and general development plans (McClelland 1993).

The Great Depression provided the impetus for major changes in Yosemite National Park when Crane Flat was established as a CCC campsite in 1933. Known as Camp 3, YNP- 3, and NP- 17, this permanent summer camp was occupied from approximately May through October from 1933 to 1942, with the exception of 1937 (Architectural Resources Group [ARG] 2003; Greene 1987; Tweed et al. 1977). Activities of the men stationed at Crane Flat, whose population numbered up to 190, included installation of telephone lines from Crane Flat to Middle Fork, replacement of the rangers' quarters and construction of a wood shed, opening fire roads and trails, landscaping and fire hazard reduction, and the eradication of *Ribes* (including gooseberry and currant bushes) as a way of controlling the spread of white pine blister rust (USDI 1939, 1941; Paige 1985). After the withdrawal of the CCC at Crane Flat in 1942, the National Park Service took up the operation of Crane Flat from the Army and continued to use it as a base for *Ribes* eradication. One locus within the Crane Flat campus site is a documented CCC Blister Rust Camp. A multi- component site at Henness Ridge was also a CCC Blister Rust Camp.

In 1973, the Yosemite Institute was granted a special use permit for the Crane Flat Blister Rust Camp that allowed the Institute to conduct environmental education programs on site. Donald Rees, founder of the Yosemite Institute, established Crane Flat as a secondary campus for the Yosemite Institute's School Weeks program and summer youth hostel.

Crane Flat Setting

In 1915, one year prior to inception of the National Park Service, a Ranger patrol cabin was constructed at the location of the current campus, to greet visitors entering Yosemite via Big Oak Flat Road. In 1940, a new ranger duplex and kiosk were constructed (likely by the CCC), 0.2 miles south of the current campus. The foundation of the ranger cabin remains in tact, but the log structure was relocated by the Park Service to the Wawona cultural center in 1960. Today, the existing Crane Flat campus is comprised of 14 buildings, four of which are historic structures, and nine buildings which were constructed after 1970 (ARG 2004).

Four of the campus buildings (NPS Buildings 6013, 6014, 6015, and 6017) were evaluated and determined individually eligible for listing as historic properties (NPS 2009). The SHPO concurred with the park's determination of eligibility, in a letter dated March 25, 2009 (Appendix G), for the association of all four buildings with the Blister Rust Camp from 1946 to 1967, and for Buildings 6013 and 6017 for their association with the CCC. Because NPS Buildings 6013, 6014, 6015, and 6017 meet the criteria for listing on the National Register of Historic Places, they are considered historic properties under NHPA and historic resources under NEPA.

Buildings 6013 and 6017 were used by the CCC from 1933 to 1941. Both buildings predate the CCC, however, and were likely constructed in association with the Crane Flat Ranger cabin built in 1915 (ARG 2004) . Building 6017, known as the oil house/light plant, was originally located adjacent to the warehouse (Building 6013) and was thought to have served travelers on Big Oak Flat Road/Tioga Road, but was relocated and reconstructed by the CCC at its current location a few hundred yards west, in 1934. Today these buildings are used as a campus storage shed and bathhouse.

By 1946, several surplus Navy buildings were moved to Crane Flat for use at the Blister Rust camp. These buildings were originally military field- type temporary structures that had been used as a short- term naval hospital at the Ahwahnee during World War II (ARG 2003). The relocated buildings functioned as a dormitory and a mess hall (Buildings 6015 and 6014) (Ryan 1999a; Greene 1987), which have continued to serve the same purposes to the present day. The campus as a whole does not appear to qualify as a NRHP District due to lack of integrity and modern changes to several buildings.

The Crane Flat area is composed of four component landscapes (Pacific Legacy 2006), which somewhat correlate with the archeological loci discussed previously. Defined as the Gobin/Hurst Way Station, Ranger Station, CCC Camp, and the Blister Rust Camp, these four component landscapes dated from different time periods of occupation and overlapped one another in some instances. Largely due to the substantial alterations that have occurred over time, leading to a loss of the landscape's essential character- defining features, none of the four component landscapes appear to have sufficient integrity to be eligible for listing on the NRHP. Consequently, the Crane Flat landscape as a whole is considered not eligible for NRHP inclusion.

Henness Ridge Setting

Henness Ridge was the site of a Blister Rust Camp from 1946- 1960s, however, no historic structures or buildings remain and no cultural landscapes have been formally identified at that location. Water utility improvements would be located in the Chinquapin Historic District / Proposed Wawona Road Component Cultural Landscape (Chinquapin Developed Area Cultural Landscape) (eligible), and Old Glacier Point Road (eligible), and Wawona Road (potentially eligible).

The Chinquapin Developed Area Cultural Landscape encompasses not only the features of the Chinquapin Historic District, but also includes the whole intersection as well as an associated water tank located approximately 600 feet from the Comfort Station (Sandy and DuBarton; 2007). The period of significance for the Chinquapin Developed Area is 1933 to 1938, during which the buildings and landscape were designed and built. Proposed contributing features include: the Glacier Point Road and Wawona Road intersection, the Ranger Station (1934), Garage / Storage (1934), Comfort Station (1933), and Redwood Water Tank (1936). Of the contributing structures evaluated as part of the *Glacier Road Rehabilitation Environmental Assessment* (NPS; 2007), the redwood water tank (located along the Old Wawona Road), the double pipe culvert along Wawona Road, the water fountain in front of the Chinquapin Comfort Station, and the island in front of the Ranger Station contribute to the significance of the Chinquapin Developed Area as a cultural landscape.

Environmental Consequences

Impacts and Determination of Effect under Alternative 1 (No- Action Alternative)

Operation- related Impacts on Historic Properties. Continued use of the existing campus at Crane Flat would result in no adverse effect under Section 106 of the NHPA to two buildings associated with the CCC from 1934 to 1943 and the 1946 to 1967 Blister Rust Camp (Buildings 6013 and 6017) and two buildings (Buildings 6014 and 6015) associated with the Blister Rust Camp of 1946 to 1967, each of which were determined individually eligible for listing on the NRHP and are thus historic properties. Under Alternative 1, existing use and conditions of the buildings would remain unchanged.

Proper education and direction regarding federal laws and NPS policies and their protection of cultural resources on federal lands would minimize the effects of visitor use on the historic properties (Buildings 6013, 6014, 6015, and 6017) pursuant to 36 CFR 800.5(b). Activities would not significantly alter, directly or indirectly, any of the characteristics of the historic properties that qualify them for inclusion on the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. The management of and routine maintenance and repairs to historic buildings, structures, and objects would continue to be managed under the park's 1999 PA. With continuing adherence to the guidelines presented in the PA and in keeping with the Secretary of Interior's *Standards for the Treatment of Historic Properties*, there would be no adverse effect. Therefore, visitor use and routine maintenance and repair of existing Crane Flat facilities would result in no adverse effect to historic properties.

Impact Significance and Determination of Effect. No adverse effect on four historic properties.

Conclusion. Under Alternative 1, the campus at Crane Flat would remain in its current condition, and campus operations at Crane Flat would continue as they have in the past. No construction- related impacts would occur. Operation- related impacts would include non- significant impacts by visitor use or routine maintenance and repair of historic structures, and buildings., No historic landscapes are present within the Crane Flat APE. Under Alternative 1, campus operations would have no adverse effect on four historic properties.

Impairment. Because there would be no change to the natural and cultural integrity of Yosemite National Park under Alternative 1, built historical resources and cultural landscapes in Yosemite National Park would not be impaired.

Impacts and Determination of Effect under Alternative 2 – (Crane Flat Redevelopment)

Construction- related Impacts on Built Historic Resources and Cultural Landscapes. Construction activities to redevelop the Crane Flat campus would result in an adverse effect under Section 106 of the NHPA to two buildings associated with the Blister Rust Camp of 1946 to 1967 (Buildings 6014 and 6015), which have been individually determined eligible for listing on the NRHP and are thus historic properties, because the dining hall and student dorm would be dismantled and removed from their historic location. Moreover, the redevelopment at the Crane Flat campus would alter the setting and introduce visual elements that might diminish the integrity of two other historic properties (Buildings 6013 and 6017) that will not be removed. The Crane Flat landscape has been determined not eligible for listing on the NRHP and thus is not considered a historic property. The adverse effect on historic properties under Section 106 of the NHPA would be resolved in accordance with Stipulation VIII (A) of the 1999 PA.

Standard mitigating measures include recordation, salvage, and documentation. Buildings will be documented according to the standards of the Historic American Buildings Survey. In addition, the Yosemite historical architect will conduct a documented inspection to identify architectural elements that may be reused in rehabilitating similar historic structures in Yosemite.

Therefore, construction activities would result in an adverse effect to two historic properties (Buildings 6014 and 6015), no adverse effect to two historic properties (Buildings 6013 and 6017).

Impact Significance and Determination of Effect. Redevelopment of the Crane Flat Campus would result in an adverse effect on two historic properties (Buildings 6014 and 6015). The adverse effect on historic properties under Section 106 of the NHPA would be resolved in accordance with the 1999 PA. There would be no adverse effect to two historic properties (Buildings 6013 and 6017).

Operation- related Impacts on Built Historic Resources and Cultural Landscapes. Proper education and direction regarding federal laws and NPS policies and their protection of cultural resources on federal lands would avoid or minimize the effects of visitor use on Buildings 6013 and 6017 pursuant to 36 CFR 800.5(b). Activities would not significantly alter, directly or indirectly, any of the characteristics of the two remaining historic properties that qualify them for inclusion on the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association.

The management of and routine maintenance and repairs to historic buildings, structures, and objects would continue to be managed under the park's 1999 PA. With continuing adherence to the guidelines presented in the PA and in keeping with the Secretary of Interior's *Standards for the Treatment of Historic Properties*, there would be no adverse effect on historic properties.

Conclusion. Under Alternative 2, the Yosemite Institute would redevelop the Crane Flat campus, resulting in a slightly larger development footprint. Construction- related impacts would include adverse effects to two historic properties (removal of Buildings 6014 and 6015) which would be resolved in accordance with the 1999 PA. Operation of the campus would have no adverse effect on the two historic properties remaining after construction (Buildings 6013 and 6017).

Impairment. Because there would be no change to the natural and cultural integrity of Yosemite National Park under Alternative 2, built historical resources and cultural landscapes in Yosemite National Park would not be impaired.

Impacts and Determination of Effect under Alternative 3–Henness Ridge Development and Crane Flat Restoration

Under Alternative 3, a new campus would be developed at Henness Ridge, new water systems at Chinquapin garage, and campus activities would be moved to the Henness Ridge area. At Crane Flat, three historic structures (Buildings 6013, 6014, and 6015) would be removed along with all modern buildings and infrastructure, and the area would be restored to natural forest and meadow conditions.

Construction- related Impacts on Historic Resources. Development at Henness Ridge would include construction of new buildings and associated structures. Under this alternative, YI operations and activities would discontinue at the Crane Flat location, and Crane Flat campus site would be restored to essentially natural conditions. No historic structures, buildings, or cultural landscapes considered historic properties were identified at the Henness Ridge site. Therefore, no historic properties would be affected at Henness Ridge as a result of construction of the campus at that location.

The water treatment system would be installed and concealed inside the historic Chinquapin Ranger Station garage and the water tank would be emptied and structurally stabilized. The changes would be designed in consultation with the Park Historic Architect and pursuant to the 1999 PA. Therefore, there would be no adverse effect to historic structures or cultural landscape associated with the Chinquapin Historic District / Developed Area Cultural Landscape. Actions within the Old Glacier Road and Wawona Road corridors would have no adverse effect on historic properties, pursuant to the 1999 PA, because activities would not significantly alter, directly or indirectly, any of the characteristics of the historic property that qualify them for inclusion on the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association.

Impact Significance and Determination of Effect. A no historic properties effected determination for historic structures, buildings, or cultural landscapes is appropriate for the Henness Ridge site. Water utility improvements in the Chinquapin area would have no adverse effect to historic properties.

Operation- related Impacts on Built Historic Resources and Cultural Landscapes. Due to the lack of historic structures, buildings, or cultural landscapes in the Henness Ridge area, no impacts are anticipated from operation of the campus.

Restoration- related Impacts on Built Historic Resources and Cultural Landscapes. Demolition activities to remove buildings at the Crane Flat Campus to a natural state would result in an adverse effect under Section 106 of the NHPA to three historic properties (Buildings 6013, 6014, and 6015) determined eligible for listing on the National Historic Register. The adverse effect on three historic properties under Section 106 of the NHPA would be resolved in accordance with Stipulation VIII (A) of the 1999 PA, with standard mitigating measures including recordation, salvage, and documentation of the three historic structures, and retention of one small historic structure (Building 6017). The three historic structures to be removed would first be documented according to the standards of the Historic American Buildings Survey (HABS). In addition, the Yosemite historical architect would conduct a documented inspection to identify architectural elements that may be reused in rehabilitating the remaining historic structure. The Crane Flat landscape is not considered eligible for listing on the NRHP and is thus not a historic property.

No adverse affect would occur to the one retained historic structure, NPS Building 6017. Methods for repairing and securing the building would follow the Secretary of Interior's Guidelines for Historic Preservation standards for salvage, interpretation, and National Register re- evaluation, following policies and regulations for the preservation and use of historic properties (16 USC470h- 2(a)1() and Treatment of Cultural Resources (Sec. 5.3.5, NPS 2006). NPS Building 6017 would continue to represent the contribution of the CCC/Blister Rust Camp at Crane Flat to Yosemite National Park.

Impact Significance and Determination of Effect. Restoration of the Crane Flat Campus would have an adverse effect on three historic properties (Buildings 6013, 6014, and 6015) that would be resolved in accordance with the 1999 PA and mitigations described herein. There would be no adverse effect on one historic property (Building 6017).

Conclusion. Under Alternative 3, there would be no impact or no effect to historic structures, buildings, or cultural landscapes at the proposed Henness Ridge campus location. Removal of the existing Crane Flat campus would result in an adverse effect to Buildings 6013, 6014, and 6015, which have been determined eligible for listing on the NRHP, that would be resolved in accordance with Stipulation VIII of the 1999 PA and mitigations described herein. There would be no adverse effect on one historic property (Building 6017).

Impairment. Because there would be no change to the natural and cultural integrity of Yosemite National Park under Alternative 3, built historical resources and cultural landscapes in Yosemite National Park would not be impaired.

AMERICAN INDIAN TRADITIONAL CULTURAL PROPERTIES

Traditional Cultural Properties (TCPs) are tangible resources to which American Indian tribes attach cultural and religious significance that are eligible for listing or listed on the NRHP and include structures, objects, districts, and geological features and archeology (Standard Operating Procedure for Coordinating NHPA and NEPA Review Process 2008). A dynamic relationship exists between these tangible entities and traditional cultural practices or beliefs. It is these intangible practices or beliefs associated with a TCP that are of central importance in defining the property's significance. Typically, practices or beliefs that give a TCP its significance are still observed in some form at the time the property is evaluated, but it is the entity that is evaluated for listing or listed on the NRHP.

Affected Environment

American Indian people have ongoing traditional cultural associations with park lands and resources. Some research has been conducted to inventory and document traditional resources important to contemporary American Indian people. Some American Indian traditional use studies, which focused on Yosemite Valley, Crane Flat, and El Portal, have been conducted.

Pacific Legacy and Davis- King Associates (2006) conducted a baseline study of existing American Indian traditional use data and limited oral histories for the Crane Flat area for this project. Although not definitive, Pacific Legacy and Davis- King Associates (2006) determined that Crane Flat and Meadow may represent a "traditional cultural property" as defined in Parker and King (1998). The study (Pacific Legacy and Davis-King Associates 2006) determined there was sufficient information from the American Indian traditional use records and limited oral history to support the initial identification of Crane Flat and Meadow as a TCP. Pacific Legacy and Davis- King Associates (2006) recommended that a formal evaluation of Crane Flat and Meadow as a TCP be undertaken and the identification and evaluation efforts should follow the guidelines established in *National Register Bulletin 38* (Parker and King 1998). They recommended that additional work should include archival research, interviews with informants, and field inspection and recordation. Consequently, the National Park Service is managing the Crane Flat and Meadow Area as a TCP.

On behalf of the North Fork Rancheria, Picayune Rancheria, and the American Indian Council of Mariposa County (also known as the Southern Sierra Miwuk Nation), Gaylen Lee (2009) prepared a brief overview of American Indian use at Henness Ridge for this project. The Henness Ridge site was identified as an area used by contemporary American Indians, but it was not identified as a TCP (compare with discussion in American Indian Traditional Cultural Practices section).

Yosemite National Park borders several "traditional tribal territories," most notably the Central Sierra Miwok, the Southern Sierra Miwok, the Bridgeport Paiute, the Bishop Paiute, the Kutzadika[a] (Mono Lake Paiute), the North Fork Mono, and the Chukchansi. Crane Flat has generally been associated with the Central Sierra Mewuk and the Kutzadika[a], and is located on the boundary of Southern Sierra Miwok territory (Barrett 1908; Kroeber 1925; Merriam 1902- 1930, 1907).

Crane Flat Setting

The Crane Flat area is considered a crossroads by many American Indian people (Pacific Legacy and Davis-King Associates 2006). At least six trails have been identified in the vicinity of Crane Flat. The trails went to Tamarack, Crocker, "toward the lookout" (presumably the Crane Flat Lookout), Big Meadow, Foresta, and toward the Valley. Among the more prominent early trails was the Mono Trail that connected the El Portal/Big Meadow area with Tamarack and Gin Flats slightly east of Crane Flat, and then proceeded down Bloody Canyon to Mono Lake. Variations of these trails' routes are in use today. Although it is not known if these trails are the remains of prehistoric routes or more modern routes, American Indian trails likely abounded in the area before the advent of the Big Oak Flat Road with its antecedent and subsequent variations. Several prehistoric archeological sites have been recorded in the general area of Crane Flat and Meadow.

Although no specific instances related to the American Indian settlement of Crane Flat have been discovered, the area has continued to be of cultural significance to local California American Indian tribes with ancestral cultural association with park lands. The most significant traditional practice associated with Crane Flat and Meadow is the use of the area as a meeting and gathering place because of their location at a crossroads. The area is also an important gathering place due to the presence of abundant resources associated with economic, medicinal, and spiritual traditional practices. Most notably, great gray owl feathers, moth cocoons, angelica root, and other food, medicinal, and other traditional plants were gathered in the area.

Sufficient information is available from the American Indian traditional use records and limited oral history to support the preliminary evaluation of Crane Flat and Meadow as a potential TCP (Pacific Legacy and Davis-King Associates 2006). The National Park Service is managing the area as a TCP. Although no boundaries have been established, the Crane Flat Campus lies within the NPS- managed Crane Flat and Meadow TCP.

A site visit between the National Park Service and American Indian tribes with traditional cultural ties to the Crane Flat area was conducted on August 26, 2008. Concern was expressed by the attending tribes with regard to the natural resources present and the existing impact of the environmental education campus on those resources. The tribes expressed interest in collaborating with Yosemite Institute on educational programs for this area. The National Park Service implements continuous ongoing consultation regarding measures to avoid or minimize impacts to traditional uses and significant areas.

Henness Ridge Setting

Although there is currently not enough available information to identify and manage the Henness Ridge area as a TCP, it is regarded by the associated tribes as a location of cultural significance with potential for education. The three associated tribes expressed interest in collaborating with Yosemite Institute on educational programs for this area. The National Park Service implements continuous ongoing consultation regarding measures to avoid or minimize impacts to traditional uses and significant areas.

Environmental Consequences

Impacts and Determination of Effect under Alternative 1 (No- Action Alternative)

Operation- related Impacts on TCPs. Use of the Crane Flat and Meadow area would continue as the area is used today. Consultation by the National Park Service with associated tribes would continue. No operations impacts have been identified.

Impact Significance and Determination of Effect. A no adverse effect determination for the Crane Flat and Meadow TCP would be appropriate under this alternative. No indirect or direct impacts are foreseen as a result of this alternative.

Conclusion. Under Alternative 1, the campus at Crane Flat would remain in its current condition, and campus operations would continue as they have in the past. No construction- or operation- related impacts would occur. Under Alternative 1, existing uses of the area would not be changed.

Impairment. Because there would be no change to the natural and cultural integrity of Yosemite National Park under Alternative 1, TCPs would not be impaired.

Impacts and Determination of Effect under Alternative 2 (Crane Flat Redevelopment)

Construction- related Impacts on Traditional Cultural Properties. The treatment of resources managed as TCPs in the Crane Flat and Meadow area would continue with ongoing consultation between the National Park Service and American Indians with traditional cultural ties to the Crane Flat area. With continuing consultation, the potential for an adverse effect on resources managed as TCPs would be minimized to no adverse effect. Therefore, construction activities would result in no adverse effect to TCPs.

Impact Significance and Determination of Effect. No impact to resources managed as a TCP.

Operation- related Impacts on Traditional Cultural Properties. Use of the Crane Flat and Meadow area would continue as the area is used today, which would result in no adverse effect to resources managed as a TCP.

Impact Significance and Determination of Effect. A no adverse effect determination is appropriate for the Crane Flat and Meadow TCP under this alternative.

Conclusion. Under Alternative 2, the Yosemite Institute would redevelop the Crane Flat campus, resulting in a slightly larger development footprint. Under Alternative 2, no adverse effects would occur to the Crane Flat and Meadow TCP.

Impairment. Because there would be no change to the natural and cultural integrity of Yosemite National Park under Alternative 2, traditional cultural properties would not be impaired.

Impacts and Determination of Effect under Alternative 3 (Henness Ridge Center and Crane Flat Campus Restoration)

Construction- related Impacts on TCPs. The treatment of resources managed as a TCP in the Crane Flat and Meadow area would continue with ongoing consultation between the National Park Service and American Indians with traditional cultural ties to the Crane Flat area. With continuing consultation, the potential for an adverse effect on resources managed as TCPs would be minimized to no adverse effect.

Therefore, construction activities associated with restoration of the Crane Flat Campus would result in no adverse effect on TCPs.

Impact Significance and Determination of Effect. No adverse effect to resources managed as a TCP.

Operation- related Impacts on TCPs. Use of the new campus at Henness Ridge by visitors and routine maintenance of facilities would have no effect on TCPs because no historic properties are present at this location.

Impact Significance and Determination of Effect. No effect to TCPs by operation of a new campus at Henness Ridge., because no historic properties are present.

Restoration- related Impacts on Traditional Cultural Properties. The treatment of resources managed as a TCP in the Crane Flat and Meadow area would continue with ongoing consultation between the National Park Service and American Indians with traditional cultural ties to the Crane Flat area. With continuing consultation, the potential for an adverse effect on resources managed as a TCP would be minimized to no adverse effect. Therefore, restoration of the Crane Flat Campus would result in no adverse effect to TCPs.

Impact Significance and Determination of Effect. No adverse effect to resources managed as a TCP.

Conclusion. Under Alternative 3, a new campus would be developed at the Henness Ridge site and the Crane Flat campus would be restored. Construction and operation- related impacts at Henness Ridge would have no effect on TCPs because none have been identified at that site. There would be no adverse effect to resources managed as the Crane Flat and Meadow TCP as a result of the Crane Flat Restoration.

Impairment. Because there would be no change to the natural and cultural integrity of Yosemite National Park under Alternative 3, TCPs would not be impaired.

AMERICAN INDIAN TRADITIONAL CULTURAL PRACTICES

Traditional cultural practices are resources which are culturally valued real property; social use of the biophysical, geophysical, or built environment; and socio- cultural attributes, including social cohesion, lifeways, religious practices, and other social institutions such as education and recreation that play out in the biophysical and built environment. The cultural value of these resources may have acquired a historic merit by their repeated use over time, but they do not meet the standards for consideration as historic properties listed in the NRHP.

Affected Environment

American Indian people have ongoing traditional cultural associations with park lands and resources. Very little research has been conducted to inventory and document traditional resources important to contemporary American Indian people. Some American Indian traditional use studies, which focused on Yosemite Valley, Crane Flat, and El Portal have been conducted. Pacific Legacy and Davis- King Associates (2006) conducted a baseline study of existing American Indian traditional use data and limited oral histories for the Crane Flat area for this project. They identified Crane Flat and Crane Flat meadow as an area that was occupied by several different tribes and as a gathering place for a variety of natural resources. On behalf of the North Fork Rancheria, Picayune Rancheria, and the American Indian Council of Mariposa County (also known as the Southern Sierra Miwuk Nation), Gaylen Lee (2009) prepared a brief overview of American Indian use at Henness Ridge for this project.

Yosemite National Park borders several "traditional tribal territories," most notably the Central Sierra Miwok, the Southern Sierra Miwok, the Bridgeport Paiute, the Bishop Paiute, the Kutzadika[a] (Mono Lake Paiute), the North Fork Mono, and the Chukchansi. Crane Flat has generally been associated with the Central Sierra Me-wuk and the Kutzadika[a], and is located on the boundary of Southern Sierra Miwok territory (Barrett 1908; Kroeber 1925; Merriam 1902- 1930, 1907).

Crane Flat Setting

The Crane Flat area is considered a crossroads by many American Indian people (Pacific Legacy and Davis-King Associates 2006). At least six trails have been identified in the vicinity of Crane Flat. Variations of these trails' routes are in use today. Although no specific instances related to American Indian settlement of the Crane Flat Campus have been discovered, the area has continued to be of cultural significance to local California American Indian tribes with ancestral cultural association with park lands. The most significant traditional practice associated with Crane Flat and Meadow is the use of the area as a meeting and gathering place because of their location at a crossroads. The area is also an important gathering place due to the presence of abundant resources associated with economic, medicinal, and spiritual traditional practices. Most notably, great gray owl feathers, moth cocoons, angelica root, and other food, medicinal, and other traditional plants were gathered in the area. The National Park Service is managing the area, which includes the Crane Flat Campus, as the Crane Flat and Meadow TCP.

A site visit between the National Park Service and American Indian tribes with traditional cultural ties to the Crane Flat area was conducted on August 26, 2008. Attending tribes expressed concern about the natural resources present and the existing impact of the environmental education campus on those resources. The tribes expressed interest in collaborating with Yosemite Institute on educational programs for this area. The National Park Service implements continuous ongoing consultation regarding measures to avoid or minimize impacts to traditional uses and significant areas.

Henness Ridge Setting

The Henness Ridge area has been traditionally used by American Indians during travel to higher elevations in the Sierra (Lee 2009). Miwok, Chukchansi, and Mono tribes indicate that this was a place where chinquapin nuts and other food sources such as fungi and gooseberry that still grow in the area were gathered during their travels (Lee 2009). The tribes continue to value the area for those resources as well as the "cat face" sugar pine trees that produce a form of candy in the sap that releases from the cat face scars caused by fires.

During his surface reconnaissance of the general project area in May of 2008, Lee (2009) reported discovering an American Indian "quartz uni- face tri- side projectile point and a beginning mortar hole" thought possibly to "have been for a special person."

Although there is currently not enough available information to identify and manage the Henness Ridge area as a traditional cultural property, it is regarded by the associated tribes as a location of cultural significance with potential for education. The three associated tribes expressed interest in collaborating with Yosemite Institute on educational programs for this area. The National Park Service implements continuous ongoing consultation regarding measures to avoid or minimize impacts to traditional uses and significant areas.

Environmental Consequences

Impacts under Alternative 1 (No- Action Alternative)

Operation- related Impacts on Traditional Cultural Practices. Continued use of the existing campus at Crane Flat would continue by American Indians with local cultural affiliation. The National Park Service coordinates closely with local American Indian tribes with traditional cultural ties to the Crane Flat area through existing agreements and ongoing consultation, and the tribes have access to and use of special resources around Crane Flat and Meadow. Under Alternative 1, this would not change. Ongoing use of the Crane Flat campus would not change contemporary use of the area by local American Indian tribes. Use of the Crane Flat Campus by the Yosemite Institute would not restrict local American Indian tribes' use of the area pursuant to the American Indian Religious Freedom Act of 1979 (AIRFA) or Executive Order 13007.

Impact Significance. Under Alternative 1, no impact to traditional cultural practices is anticipated under this alternative.

Conclusion. Under Alternative 1, the campus at Crane Flat would remain in its current condition, and campus operations would continue as they have in the past. No construction or operation related impacts would occur. Under Alternative 1, existing uses of the area would not be changed.

Impairment. Because there would be no change to the natural and cultural integrity of Yosemite National Park under Alternative 1, traditional cultural practices in Yosemite National Park would not be impaired.

Impacts under Alternative 2 (Crane Flat Redevelopment)

Construction- related Impacts on Traditional Cultural Practices. The management or treatment of American Indian traditional cultural practices in the Crane Flat area would continue with ongoing consultation between the National Park Service and American Indians with traditional cultural ties to the Crane Flat area. Because of the short- term nature of the construction activities, they would have no impact on traditional cultural practices.

Impact Significance. No impact on traditional cultural practices.

Operation- related Impacts on Traditional Cultural Practices. The management or treatment of American Indian traditional cultural practices in the Crane Flat area would continue with existing agreements and ongoing consultation between the National Park Service and American Indians with traditional cultural ties to the Crane Flat area. With continuing consultation, the potential for impacts on traditional cultural practices would be reduced.

Impact Significance. No significant impact to resources associated with traditional cultural practices in the Crane Flat and Meadow area.

Conclusion. Under Alternative 2, the Yosemite Institute would redevelop the Crane Flat campus, resulting in a slightly larger development footprint. Under Alternative 2, no impacts would occur on the traditional cultural practices of the Crane Flat area.

Impairment. Because there would be no change to the natural and cultural integrity of Yosemite National Park under Alternative 2, traditional cultural practices in Yosemite National Park would not be impaired.

Impacts under Alternative 3 (Henness Ridge Center and Crane Flat Campus Restoration)

Construction- related Impacts on Traditional Cultural Practices. Construction activities to develop a new campus at Henness Ridge would have a minor impact under NEPA because local "cat face" trees would be disturbed or removed. The management or treatment of American Indian traditional cultural practices in the Henness Ridge area would continue with ongoing consultation between the National Park Service and American Indians with traditional cultural ties to the area. Construction activities would result in local, short-term, and minor impacts to local "cat face" trees. Removal of buildings and other facilities associated with the Crane Flat Campus would result in no impacts to American Indian use of the area.

Impact Significance. Local, short- term, and minor impacts to local "cat face" trees at Henness Ridge. No impacts to traditional cultural practices due to Crane Flat restoration. Restoration of Crane Flat would have a local, long- term, beneficial impact.

Operation- related Impacts on Traditional Cultural Practices. Although some "cat face" trees would be removed during construction, the park continues to manage for this resource through appropriate fire management activities.The management or treatment of American Indian traditional cultural practices in the Henness Ridge area would continue with ongoing consultation between the National Park Service and American Indians with traditional cultural ties to the area. Visitor use and routine maintenance of the new campus at Henness Ridge would result in local, long- term, negligible impacts to local "cat face" trees.

Impact Significance. Local, long- term, and negligible impacts to local "cat face" trees. Impacts to traditional cultural practices due to Crane Flat Restoration would be local, long- term, and negligible.

Restoration- related Impacts on Traditional Cultural Practices. Restoration of the Crane Flat campus to essentially natural conditions with removing visible evidence of the campus, in turn for developing a campus at Henness Ridge, would result in no impacts to American Indian use of the area.

Impact Significance. Restoration- related impacts to American Indian traditional cultural practices due to restoration of the Crane Flat Campus would be local, long- term, and beneficial.

Conclusion. Under Alternative 3, a new campus would be developed at the Henness Ridge site and the Crane Flat campus would be restored. Construction- and operation- related impacts would include minor impacts to local "cat face" trees at Henness Ridge. There would be a local, long- term, beneficial impact to traditional cultural practices as a result of the Crane Flat restoration.

Impairment. Because there would be no change to the natural and cultural integrity of Yosemite National Park under Alternative 3, traditional cultural practices in Yosemite National Park would not be impaired.

VISITOR EXPERIENCE AND RECREATION

Affected Environment

Yosemite National Park, as guided by its enabling legislation and the NPS Organic Act of 1916, has two interwoven purposes: (1) the preservation of the resources that contribute to Yosemite National Park's uniqueness and attractiveness—its exquisite scenic beauty; outstanding wilderness values; a nearly full diversity of Sierra Nevada environments, including the very special sequoia groves; the awe- inspiring domes, valleys, polished granites, and other evidences of the geologic processes that formed the Sierra Nevada; historic resources, especially those relating to the beginnings of a national conservation ethic; and evidence of the American Indians who lived on the land; and (2) to make the varied resources of Yosemite National Park available to people for their individual enjoyment, education, and recreation, now and in the future. (NPS *General Management Plan* [1980])

In general, there are two groups of Yosemite National Park visitors: those who visit the developed or "frontcountry" areas of the park (including Yosemite Valley and Wawona), and those that visit Yosemite National Park's designated Wilderness. For many visitors, driving through the park is the primary means for experiencing the spectacular views. Even during the peak visitation season, travelers on park roads outside Yosemite Valley encounter only minor congestion, except at key activity areas and at park entrance stations. As a result, driving to Yosemite National Park is usually a pleasurable experience, contributing to visitors' enjoyment of the park. The ability to make informal stops along park roads to take advantage of the unique and varied scenery contributes to each visitor's opportunity to experience the park on his or her own terms. Some visitors, depending on season and arrival time, have opportunities to stop en route at small visitor contact stations such as the Wawona Information Station, or if entering via Tioga Road from the east, at the Tuolumne Meadows Visitor Center.

Visitor experiences in Yosemite National Park are highly individualized. Some come simply to see Yosemite National Park's icons—its waterfalls and geologic features. Others visit to experience a place they have found unique, for personal challenges, timelessness, a place and pace different from their day- to- day experiences, or a personal connection with the grandeur or intricacies of Yosemite National Park. The continuum of visitor experiences extends from highly social to isolated, from independent to directed, from spontaneous to controlled, from easy to challenging, and from natural to more urban (NPS 2000b).

Recreation opportunities in the park include sightseeing, walking, hiking, bicycling, climbing, stock use, picnicking, winter activities, rafting, swimming, fishing, and tours. The park includes several visitor services, including but not limited to overnight lodging, camping, food service, and a medical and dental clinic. The park also includes several orientation and interpretation opportunities, such as at the park's visitor centers, the Yosemite Museum, the Nature Center at Happy Isles in Yosemite Valley, the Pioneer Yosemite History Center in Wawona, and Parsons Lodge and Soda Springs in Tuolumne Meadows.

Recreation. Yosemite National Park provides a range of recreation opportunities, including camping, sightseeing, picnicking, day hiking, and cross- country skiing and snowshoeing in winter. Camping throughout Yosemite National Park is regulated differently depending on whether the activity occurs in the developed or Wilderness areas.

According to a study of visitors exiting the park, about 90% of visitor groups reported sightseeing as an activity their parties participated in while in the park (Gramann 1992). A total of 60% of visitor parties took photographs, and more than half reported nature study as an element of their trip. Sitting or standing quietly, absorbed in thought or in awe of one of Yosemite National Park's majestic views, was found to be basic to the park experience. Artistic pursuits and wildlife viewing were also important to the enjoyment of the park. A total of 44% of summer visitors arriving in their own car and 32% of bus passengers reported day hiking while in the park. A greater proportion of park visitors hike during other seasons.

Orientation and Interpretation. Visitors to Yosemite National Park can use park and other information resources to plan their visits. Yosemite National Park's website provides information about park lodging and activities, and the park's public information office mails previsit materials to those requesting them by phone or mail. The Yosemite Association and Yosemite Institute also have interactive websites, offering more in-depth orientation and the sale of books and maps. The park also provides assistance (updated information, publications, and seasonal staffing) to local, multi- agency visitor centers where visitors can stop en route.

Once at park entrance stations, visitors receive free park publications with trip and activity planning information. During the summer and early fall, information stations in Wawona and Big Oak Flat are staffed to provide additional assistance. In summer, the Tuolumne Meadows Visitor Center introduces the area to visitors traveling through the park. Each of these facilities provides a selection of helpful park guidebooks and other resources sold by the Yosemite Association, a nonprofit partner of the National Park Service.

Park interpreters serve a primary resource preservation role by conveying information and educational programs to visitors and park employees about the importance of park ecosystems and the relationships among various park resources. This includes educational programs provided by park rangers and park partners, including the Yosemite Institute. The interpretive staff provides information to visitors about wilderness resources, policies, regulations, conditions, and trails at information centers, in programs, on roving contact assignments, and open- air tram tours in Yosemite Valley. The primary information source for wilderness is the wilderness centers in Yosemite Valley, Tuolumne, Big Oak Flat, and Wawona, which are staffed by wilderness rangers. Interpretive programs offered by the park are instrumental in providing education and thus lessening or preventing resource impacts. A proactive interpretation and education program is important to promote protection of natural resources for the long- term enjoyment of park visitors.

A wide range of interpretive programs is available. Throughout Yosemite National Park, NPS interpreters provide ranger- led walks, talks, and evening programs. Interpreters help visitors connect to the park and our American heritage. Interpretation also serves as a catalyst for inspiring visitors to gain a greater understanding of themselves and the world through their park experience. In summer, rangers also lead multi- day High Sierra Camp loop trips in the Yosemite Wilderness area. Wilderness programs can focus on bears, wildflowers, the natural history of the wilderness, the hydrologic attributes of the Merced and Tuolumne watersheds, minimum- impact camping techniques, wilderness safety, park policies, and other topics. Park partners, including the Yosemite Association and Yosemite Concession Services, offer guided wilderness trips and a wide range of interpretive opportunities throughout the park. The Sierra Club and The Ansel Adams Gallery also provide interpretive opportunities within Yosemite Valley.

Crane Flat Setting

The Crane Flat area offers the visitor a variety of experiences, including sightseeing, camping, and hiking. Public camping in the Crane Flat area is provided at Crane Flat Campground, located northwest of the Tioga Road and Big Oak Flat Road intersection. Crane Flat Campground includes approximately 200 campsites, restrooms, an amphitheater, an entrance kiosk, and access to adjacent trails. Crane Flat Campground is approximately 1 mile west of the existing environmental education campus. In addition to Crane Flat Campground, there are several campgrounds located to the east of the environmental education campus, including Tamarack Flat Campground (campsites and wilderness trailhead), White Wolf Campground (campsites, tent cabins, lodge with food services, and wilderness trailhead), and Yosemite Creek Campground (campsites and wilderness trailhead). Tamarack Flat Campground is the closest of these campgrounds to the environmental education campus and is approximately 5 miles from the campus.

Sightseeing opportunities in the Crane Flat area include alpine views of meadows, domes, and distant peaks. Picnicking in the Crane Flat area is enjoyed by visitors and includes the use of designated picnic areas at the Crane Flat Campground, and use of casual roadside turnouts, meadow areas, and Tuolumne Grove. There are no concessionaire food service facilities at the Crane Flat area; however, a grocery store is located at the Tioga Road and Big Oak Flat Road intersection.

The Crane Flat area includes Old Big Oak Flat Road, a paved road that is closed to vehicle traffic and provides access to the Tuolumne Grove of Giant Sequoias, located approximately 1 mile from Tioga Road. Old Big Oak

Flat Road continues past the Tuolumne Grove to the Hodgdon Meadow Campground and the Big Oak Flat Entrance to the park.

Cross- country skiing and snowshoeing are winter activities conducted near Crane Flat. Routes primarily follow summer trails, marked ski trails, or traverse the open meadows. Designated cross- country ski trails in wilderness and accessible from Crane Flat include the Tamarack Flat, White Wolf, and Hodgdon Meadow trails.

Swimming, wading, and fishing occur at creeks and lakes accessible from trails in the Crane Flat area. The existing environmental education campus at Crane Flat also provides recreation opportunities for program participants, such as basketball and volleyball.

Overnight lodging in the Crane Flat area is only available at the existing environmental education campus, and is available only to those attending campus programs. A service station and grocery store are located at the intersection of Big Oak Flat Road and Tioga Road. The White Wolf Lodge and Campground, east of Crane Flat, also provides food service. The environmental education campus provides food services to program participants, but is not open to the public. Additional food, retail, and visitor services are available in Yosemite Valley, Tuolumne Meadows, and Wawona.

Trails. Designated Wilderness surrounds the 5- acre campus site, and a series of informal trails used by YI staff for teaching branch out from the campus on the north side of Tioga Road. The Tuolumne Grove Road is the nearest formal trail to the campus. No other official trails pass near the campus, although park visitors and participants at the Crane Flat campus use informal trails to access nearby meadows. Backpackers and long-distance hikers do not frequent the area. There is a road that leads from Big Oak Flat Road to a fire lookout just northeast from the campus. This road is used seasonally by cars, and in winter, the campus programs use snowshoes to access the fire lookout.

Yosemite Institute. Yosemite Institute provides educational field- science programs for school- age children and some adult groups in the Crane Flat area at the YI environmental education campus, in Yosemite Valley, and in Yosemite Wilderness. Guided wilderness opportunities are also provided to program participants. Yosemite Institute uses the outdoor environment to introduce environmental themes and concepts that are designed to be educational, interactive, and interdisciplinary. Field instructors are skilled naturalists, college graduates with degrees in related disciplines, and are experienced in teaching and leading groups in outdoor settings.

Yosemite Institute's outstanding day and evening programs are organized around themes illustrated through a mix of explorations, hiking, group discussions, activities, and personal reflection. All programs cultivate a sense of place, and stress interconnections and stewardship. Subject areas include forest and fire ecology, winter ecology, global environment, wilderness skills, NPS history, native culture, arts and humanities, invertebrates, plant communities, mammals, birds, botany, earth science, pioneer history, soils, meteorology, geology, ecological concepts, succession, and reptiles and amphibians. Activities include animal tracking, riparian habitat study, group problem- solving, hiking and exploration, journaling, interactive games, cross-country skiing and snowshoeing, wilderness camping and orienteering skills, and natural history investigations.

Henness Ridge Setting

Henness Ridge offers the visitor some opportunities for recreation and interpretation but perhaps less so than those found at Crane Flat. Common visitors to the area include those traveling between Yosemite Valley and Wawona, nearby campers, and Yosemite West residents and guests.

Public camping is not available at Henness Ridge, but is available several miles away at the Bridalveil Creek and Wawona Campgrounds. Bridalveil Creek is located past the Badger Pass Ski Area on the way to Glacier Point. The Wawona Campground is near the Wawona Information Center and the South Entrance. The Bridalveil Creek Campground is closed in winter.

Yosemite West is a small year- round community of vacation and primary residences off of Henness Ridge Road just outside the Yosemite Park boundary. These residents and guests have the most convenient access to the trails and sightseeing opportunities of the Henness Ridge area.

Sightseeing opportunities in the Henness Ridge area include some views of forested valleys and distant peaks. No picnicking is available in the Henness Ridge area. The nearest picnicking areas are located at Wawona near the Wawona Information Station to the south. Casual roadside turnouts along the Glacier Point Road do provide informal opportunities for picnicking though. The nearest concessionaire food service facilities are located at the Wawona Information Station and further south near the South Entrance.

Popular day hiking locations near Henness Ridge include trails crossing or originating on the Glacier Point Road, at Wawona, and at the Mariposa Grove. The Mariposa Grove is the largest grove of giant sequoias in the park. Designated Wilderness trails near Henness Ridge include the Deer Camp trail and those near Bridalveil Falls, Wawona, and along Glacier Point Road. Various historic railroad beds near Henness Ridge also offer day hiking opportunities.

Cross- country skiing and snowshoeing are winter activities conducted near the Badger Pass Ski Area. The Ostrander Ski Hut is a popular destination from the Bridalveil trailhead. Routes primarily follow summer trails, marked ski trails, or traverse the open meadows. Swimming, wading, and fishing occur at creeks and lakes accessible from trails in the Henness Ridge area.

The nearest overnight accommodations to Henness Ridge are at Yosemite West, where rental home, condominium, and bed and breakfast lodging is available. Visitor services, including food and limited retail, are available at the Wawona Information Station. Additional visitor services are available in Yosemite Valley and at Fish Camp south of the South Entrance.

Trails. Designated Wilderness is east of the proposed site. The Deer Camp Trail is the nearest formal trail to the campus; the trailhead is located at the intersection of Henness Ridge Road and Wawona Road and leads southeast. No other official trails pass by the site, though some recreationists walk along old roads south and southwest of the site. Backpackers and long- distance hikers do not frequent the area. The Old Glacier Point Trail begins at Chinquapin and is the only other trail in the vicinity of the site. As the name suggests it is the former road and leads northeast.

Environmental Consequences

Intensity Level Definitions

Impacts to visitor experience and recreation were evaluated using the process described in the introduction to this chapter. Impact threshold definitions for visitor experience and recreation are as follows:

Negligible: Visitor experience and recreation would not be affected. Any effects to visitor experience and recreation would be slight and short- term.

Minor: Effects to visitor experience and recreation, such as an increase in the number of visitors, would be detectable. If mitigation is needed to offset adverse effects, it would be relatively simple to implement.

Moderate: Effects to visitor experience and recreation would be readily apparent. Mitigation would probably be necessary to offset adverse effects.

Major: Effects to visitor experience and recreation would be readily apparent and would substantially change visitor experience and recreation in Yosemite National Park. Extensive mitigation would probably be necessary to offset adverse effects, and its success could not be guaranteed.

Impairment

Definition

Impairment is not applicable to this topic.

Impacts under Alternative 1 (No- Action Alternative)

Operation- related Impacts. Under the No- Action Alternative, the campus at Crane Flat and associated activities would remain in their existing condition. The YI visitor and recreation experience would be moderately adversely affected in the long term by limiting student enrollment size to existing levels at Crane Flat and Curry Village and by deteriorating facilities with noncompliant features (e.g., ADA requirements) at Crane Flat. The impact would be regional because students from throughout California and other areas participate in Yosemite Institute educational activities.

The *Yosemite Institute Trail Study Report* (Gibson et al. 2008) found that when crowding occurs at popular visitor locations, it is typically not due to YI groups. In the study (conducted during spring, summer, and fall), visitors had more pleasant group experiences than negative group experiences. In winter, though, visitors may have a higher expectation of solitude, especially on weekdays when YI activities occur. Student groups on trails below Columbia Rock or between Badger Pass and Summit Meadow may have a less beneficial impact on other visitors during these periods. The overall impact on visitor experience for those not affiliated with YI activities is expected to be global (as visitors come from throughout the world), long- term, and negligible.

The impact on recreation for visitors not affiliated with the Yosemite Institute would also be negligible because activities at Crane Flat do not limit the hiking, sightseeing, and other recreational experiences available to the general park visitor.

Impact Significance. Regional, long- term, moderate, adverse impact.

Conclusion. Maintaining the existing campus under the No- Action Alternative would have a moderate, adverse impact on visitor experience and recreation.

Impacts under Alternative 2 (Crane Flat Redevelopment)

Construction- related Impacts. In the short- term, there may be a minor, adverse impact to visitor experience and recreation because campus operations would be temporarily suspended during the construction phase.

Impact Significance. Regional, short- term, minor, adverse impact.

Operation- related Impacts. Under Alternative 2, the Yosemite Institute would redevelop the Crane Flat campus. The larger dormitory capacity and associated facility improvements would increase the number of students able to stay at the campus, decrease the use of facilities at Curry Village, and improve functionality of the campus. The effect of the Crane Flat campus redevelopment would be a regional, long- term, moderate, beneficial impact.

The *Yosemite Institute Trail Study Report* (Gibson et al. 2008) found that when crowding occurs at popular visitor locations, it is typically not due to YI groups. In the study (conducted during spring, summer, and fall), visitors had more pleasant group experiences than negative group experiences. In winter, though, visitors may have a higher expectation of solitude, especially on weekdays when YI activities occur. Student groups on trails below Columbia Rock or between Badger Pass and Summit Meadow may have a less beneficial impact on other visitors during these periods. The overall impact on visitor experience for those not affiliated with YI activities is expected to be global, long- term, and negligible (except in the short term, during YI closure for construction).

Recreation at Crane Flat and Yosemite Valley would be similarly affected by redevelopment of the Crane Flat campus. Crane Flat's proximity to the Tuolumne Grove and sensitive meadows provide convenient hiking, skiing, and sightseeing opportunities. Recreation impacts for YI students would be regional, long- term, minor, and beneficial. The impact on recreation for visitors not affiliated with the Yosemite Institute would be negligible because the Crane Flat redevelopment would not limit the hiking, sightseeing, and other recreational experiences available to the general park visitor.

Impact Significance. Regional, long- term, moderate, beneficial impact.

Conclusion. The redevelopment of the Crane Flat campus under Alternative 2 would have some adverse impacts on visitor experience and recreation in the short term, but in the long term, a moderate, beneficial impact would occur as better facilities and opportunities are offered to students.

Impacts under Alternative 3 (Henness Ridge Center)

Construction- related Impacts. In the short term, there may be a moderate, adverse impact to visitor experience and recreation as the proposed campus is constructed in an otherwise undeveloped area, perhaps affecting trail users or others recreating nearby. During construction, Yosemite Institute would continue to operate Crane Flat, thereby minimizing short- term impacts to educational activities and the visitor experience.

Impact Significance. Regional, short- term, moderate, adverse impact.

Restoration- related impacts. Removal of Crane Flat facilities and the restoration of native vegetation would have long- term, minor, beneficial impacts to visitor experience and recreation. Scenic views along Tioga Road would improve and confusion regarding the availability of visitor services at Crane Flat would be alleviated. The restoration would also enhance the wilderness characteristics of designated trail corridors in the area and possibly decrease the use of informal trails between Tuolumne Grove and Crane Flat.

Impact Significance. Global, long- term, minor, beneficial impact.

Operation- related Impacts. Under Alternative 3, the Yosemite Institute would establish a new campus location and program at Henness Ridge, including the provision for a fire station. The new dormitories and associated facilities would increase the total number of students currently attending YI programs, decrease the use of facilities at Curry Village, and overall improve educational activities. The effect of the new campus at

Henness Ridge would be a regional, long- term, moderate, and beneficial impact to the visitor experience, primarily due to the long- term increase in student enrollment and the quality of the new facility (such as fire safety and functionality).

The Yosemite Institute Trail Study Report (Gibson et al. 2008) found that when crowding occurs at popular visitor locations, it is typically not due to YI groups. In the study (conducted during spring, summer, and fall), visitors had more pleasant group experiences than negative group experiences. In winter, though, visitors may have a higher expectation of solitude, especially on weekdays when YI activities occur. Student groups on Deer Camp Trail may have a less beneficial impact on other visitors during these periods. The overall impact on visitor experience for those not affiliated with Yosemite Institute activities is expected to be global, long-term, and negligible (except in the short term, during YI closure for construction).

Recreation in the Henness Ridge and Yosemite Valley would be similarly affected by the proposed campus at Henness Ridge. Henness Ridge's proximity to historic logging roads (now trails), the Deer Camp Trail, and other trailheads along Glacier Point Road provide convenient hiking and sightseeing opportunities. The elevation of Henness Ridge also provides similar winter recreation opportunities to the existing Crane Flat location.

Recreation impacts for YI students would be regional, long- term, minor, and beneficial. The impact on recreation for visitors not affiliated with the Yosemite Institute would be negligible because activities associated with the proposed Henness Ridge campus would not limit the hiking, sightseeing, and other recreational experiences available to the general park visitor.

Impact Significance. Regional, long- term, moderate, beneficial impact.

Conclusion. The new campus at Henness Ridge under Alternative 3 would have some adverse impacts on visitor experience and recreation, but in the long term, a moderate, beneficial impact would occur as better facilities and opportunities are offered to an increased number of students.

PARK OPERATIONS AND FACILITIES

Affected Environment

Park operations fall into four basic categories: resources management, visitor protection, interpretation, and facility management. Resources management staff protects the natural, historic, and cultural resources of the park. Visitor protection staff performs various visitor management and resource protection duties, including enforcing laws, resolving disputes, providing emergency medical treatment, fighting fires, staffing wilderness ranger stations, and conducting search and rescue operations. Interpretation personnel conduct programs, such as ranger- led walks, talks, and tours, and staff visitor centers, produce park publications and maintain the Yosemite National Park's website. Facility management staff perform preventive and corrective maintenance on park infrastructure, including water, wastewater, and electrical utility systems, and park roads, trails, and structures. The extent and condition of park infrastructure and facilities within Yosemite National Park are described below. A detailed discussion on road and tunnels is included in the Transportation section.

There are 20 public water systems in the park; the Tuolumne Meadows and Wawona areas have the only large surface water systems. Three wells, a 2.5- million gallon water storage tank, and several distribution lines supply Yosemite Valley users with water. Five wastewater treatment facilities serve the park in El Portal, Hodgdon Meadow, Tuolumne Meadows, Wawona, and White Wolf. The National Park Service purchases power from the Pacific Gas and Electric Company, which it distributes and resells to end users in Yosemite Valley, predominantly to the concessionaire. End users in Wawona, El Portal, Foresta, and Hodgdon Meadow are served directly by Pacific Gas and Electric Company, which has facilities within the park in several places. SBC Communications supplies telephone service to Yosemite National Park and El Portal, primarily through microwave transmission. Overhead and underground lines serve various other locations throughout the park and El Portal.

Crane Flat Setting

Campgrounds and Attractions. Crane Flat and Tamarack Flat Campgrounds are the nearest campgrounds to the Crane Flat campus. Crane Flat Campground is west of the site near the junction of Tioga Road and Big Oak Flat Road, and has 166 campsites. Tamarack Flat Campground is located off of Tioga Road, approximately 5 miles east of the site, and has 52 campsites. Both campgrounds are open from June to September. The Tuolumne Grove is the nearest visitor attraction to the campus and a popular visitor destination. The Tuolumne Grove parking lot is located approximately 800 feet south of the campus, at the junction of the Tuolumne Grove Road (the Old Big Oak Flat Road) and Tioga Road. The Tuolumne Grove Road is closed to vehicle traffic and is used as the primary walking path to access the grove. For more information, please refer to the discussion on Visitor Use and Experience and Recreation.

Water Supply. Water systems at the existing environmental education campus are generally in poor condition. Water for the campus is supplied by a groundwater well at Crane Flat Meadow, south of the Tuolumne Grove parking lot. An electric pump pumps water to an above- ground, 50,000- gallon potable water storage tank located east of the campus off of Tioga Road. The bolted steel tank was installed in 1999, replacing the previous 50,000- gallon tank that had been installed in 1962. A chlorinator, located near Crane Flat Meadow, injects chlorine to treat the water before it is pumped to the storage tank. The storage tank also provides water for the Crane Flat service station (at the junction of Big Oak Flat and Tioga Roads) and the NPS residences near the Tuolumne Grove Road. Existing peak winter water demand for the Crane Flat campus is 1,656 gpd. The water supply is considered adequate for domestic use, but may be insufficient for fire control purposes. Capacity sewage system is 17,000 gpd.

Wastewater. The existing environmental education campus wastewater system consists of seven underground septic tanks that collect wastewater, which is then directed to several onsite leach fields. Three tanks are located at the shower house, three at the kitchen/dining hall, and one at the staff trailer. The three kitchen tanks collect dishwater and sink water, which is directed to a leach field north of the dining hall; the kitchen tanks and leach fields were installed in 1998 (NPS 2002b). The other systems handle sewage. The bathhouse septic system was replaced in two phases in 1999 and 2001. In 1999, two existing 1,200- gallon polyethylene tanks were removed and replaced with two 1,500- gallon and one 4,000- gallon concrete tanks, a concrete distribution box, and 370 linear feet of new leach lines. Low- flush toilets and a water meter were installed in the shower house. In 2001, based on water use and septic tank effluent quality monitoring, the 4,000- gallon tank was converted into a recirculation tank that uses textile media filters, with two duplex pumps pumping 30 gallons per month. The system includes associated control panels and alarms (NPS 2002b). Nevertheless, the wastewater system is generally considered to be inadequate and in poor condition; it also generates frequent odor complaints. Although the septic system has not backed up recently, toilets back up frequently. The reason for these backups has not been determined, but may be due to high groundwater levels in the winter or spring. Table 3- 8 shows the size of the tanks at the site and pumping frequency.

Table 3-8. Existing Septic Tank Size and Pumping Frequency for the Environmental Education Campus at Crane Flat, October 2001 through August 2002

Tank and Identification Code	Size of Tank (Gallons)	Number of pumps per year
Bathhouse Tank BH1	1,500	3
Bathhouse Tank BH2	1,500	3
Bathhouse Tank BH3	4,000	2
Kitchen Tank Kit 1 [consists of two tanks]	300 gallons each	2
Kitchen Tank Kit 2	1,500	2
Trailer Tank	400	2

Source: NPS 2002c

Energy. Electricity is provided by a 75- kilowatt generator located at the Tuolumne Grove parking lot. The generator and structure housing were installed in 1993, replacing a previous generator and generator house. Existing peak winter electric demand is 42 kilowatt- hours. Power outages occur approximately four times per year. NPS facility management staff is called when outages occur. The campus also uses propane stored in seven 495- gallon propane tanks. Existing peak winter demand is 265 gallons per month. Wood- burning stoves, used in the dining hall and student dormitories, provide space heating. Yosemite Institute purchases wood from the National Park Service, which cuts down hazardous trees and brings the wood to the woodlot in the Valley to be sold.

Telephone Service. AT&T provides telephone service to the campus. Overhead phone lines extend to the campus from a connection at the Tuolumne Grove parking lot. The campus has one public pay phone, and another is located at the Tuolumne Grove parking lot. The condition of the lines and service to the campus are reported to be poor. There is no TTY (text telephone) service for deaf visitors.

Solid Waste Disposal. A bear- proof dumpster is maintained on the site for solid waste, which is collected once a week by Total Waste Systems out of Mariposa. There are no recycling facilities on site, and YI staff collects recyclable items and drops them off at various NPS recycling facilities.

Henness Ridge Setting

The Henness Ridge site was developed by the park service and used as a Blister Rust camp in the 1940s and 1950s. Remnant water and sewer utility lines may still exist underground, at or near the site, but are no longer operable. A sand shed was removed in 2009 after snow caused a structural collapse.

Campgrounds and Attractions. The Henness Ridge location is outside high- use visitor areas and as a result there are currently no designated campgrounds in the immediate vicinity. Bridalveil Creek and Wawona Campgrounds are the nearest campgrounds to the Henness Ridge location. Bridalveil Creek Campground is northeast of the site beyond Badger Pass Ski Area off of Glacier Point Road, and has 115 campsites. Bridalveil campground is open from June through September.

Wawona Campground is open year- round and is located off of Wawona Road, approximately 11 miles south of the site. Wawona campground has 93 campsites. Further south, the Wawona visitor center has full visitor facilities, including ranger station, parking area, food service, lodging, grocery store, gift shops, and gas station. The Chinquapin Intersection is a key intersection that connects Glacier Point Road and Wawona Road and is a stopping point for many visitors. The intersection has evolved throughout the park's history and contains a variety of buildings. On the hill above the intersection are an unfinished water treatment building and a redwood water tank that holds 20,000 gallons and supplies water for Chinquapin. The historic buildings at the intersection make up the Chinquapin Historic District, which was determined eligible for inclusion on the NRHP in 1990.

Badger Pass Ski Area and Mariposa Grove of Giant Sequoias are two visitor attractions closest to the Henness Ridge site. Badger Pass Ski Area is a popular ski destination and is only open in winter from mid- December through March. Mariposa Grove is located near the park's South Entrance, off of Wawona Road. The Mariposa Grove Road is closed to cars from approximately November to April, depending on conditions. For more information, see the discussion on Recreation.

Water Supply. The park service developed a water utility line from a surface dam in nearby Rail Creek in the 1940s to supply water to the Blister Rust camp at Henness Ridge. The Henness Ridge location no longer has a functioning potable water supply. The Yosemite West residential community, just west of the site, receives its water from a series of privately owned groundwater wells. Yosemite West water system functions independently from the park. There is a non- potable surface water collection system at Indian Creek which currently serves the nearby Chinquapin visitor Comfort Station.

Wastewater. The Blister Rust camp utility system included septic pits for wastewater treatment. The Henness Ridge location does not currently have a functioning wastewater treatment system. Yosemite West residential houses are hooked up to the Yosemite West Wastewater Treatment Facility, which was enlarged in 2005 to accommodate increased sewage capacity. Yosemite West wastewater systems operate independently from the park. There currently is a small septic sytem at Chinquapin behind the Ranger Residence serving the residence and Comfort Station.

Energy. The Henness Ridge location is not connected to electricity, although there is an underground electrical line that runs along the west side of Wawona Road. This electrical line is maintained by Pacific Gas and Electric, and begins at El Portal, runs through and feeds Yosemite West and Chinquapin, and stops at Badger Pass.

Telephone Service. The Henness Ridge location is does not have telephone service, although there is an underground telephone line that runs along the west side of Wawona Road that provides telephone service to the visitor facilities at Chinquapin and Yosemite West. AT&T provides telephone service to Yosemite West and Chinquapin. All utilities are underground at Yosemite West. There are public pay phones located at Chinquapin, Badger Pass Ski Area parking lot, and Wawona.

Solid Waste Disposal. The Henness Ridge location does not have solid waste disposal. Yosemite West solid waste disposal operates independently of the park. NPS crew collects refuse from visitor facilities at Chinquapin and Badger Pass.

Road Sanding. A sand shed was located at Henness Ridge for winter road maintenance but was removed in 2009 after heavy snow caused the structure to collapse. NPS crews are temporarily using sand from nearby locations until siting a new location.

Environmental Consequences

Intensity Level Definitions

Impacts to park operations and facilities were evaluated using the process described in the introduction to this chapter. Impact threshold definitions for park operations and facilities are as follows:

Negligible: Impacts to park operations and facilities would be largely unnoticed by staff and the visiting public. Existing programs and activities would remain essentially unchanged.

Minor: Park operations and facilities would be affected, but the impacts would be limited in scope and not generally noticed by visitors. Increases or decreases in the park's operating costs and staffing workload would require some realignment of funds, but would not require substantial changes in the park's overall operating budget.

Moderate: Park operations and facilities would be measurably affected, and the impacts would be noticeable to some visitors. Increases or decreases in the park's operating costs and/or workload would require realignment of funds and would alter the scope or quality of some programs.

Major: Impacts to park operations and facilities would be widespread and readily apparent to most visitors. Increases or decreases in operating costs and/or workload would require substantial changes in funding allocation and would alter the scope and quality of multiple programs or basic operational activities.

Impairment

Definition

Impairment analysis is not applicable to this topic.

Impacts under Alternative 1 (No- Action Alternative)

Operation- related Impacts. Under the No- Action Alternative, the campus at Crane Flat would remain in its existing condition and would not meet health and safety standards as outlined by ADA and NFPA. Necessary maintenance and repairs would continue, but no major undertakings (for example, construction of new buildings) would occur. Management under the No- Action Alternative would not have any effect on the divisions of resources management and interpretation of the park.

The aging buildings and utility systems at the campus currently account for a disproportionate number of service calls to facilities management staff. Because buildings and infrastructure would not be upgraded or replaced under the No- Action Alternative, ongoing maintenance and repairs at the campus site would continue to require a disproportionate expenditure of facilities management time and resources. Toilets would continue to back up on a regular basis, and the wastewater system would continue to generate occasional odor complaints. The aging generator at Tuolumne Grove and the campus electrical system are also expected to require increasing attention over time.

Under the No- Action Alternative, the existing water supply at the Crane Flat campus would continue to be inadequate for fire protection. The approximately 60- year- old structures at the site, which are not equipped with automatic water sprinklers or other automated fire- extinguishing systems, would remain in place. Although educational programs conducted at the campus do not substantially increase the risk of fire compared with other types of uses (e.g., residential), the substandard fire protection facilities at the site would add to the challenges facing firefighters in the event of a fire at the campus site.

Impact Significance. Local, long- term, minor, adverse impact.

Conclusion. The aging buildings and infrastructure at the Crane Flat campus would continue to place disproportionate demands on facilities management staff for repair and maintenance work, and the health and safety infrastructure would remain substandard, presenting visitor protection division with additional challenges. Under the No- Action Alternative, the campus would have an adverse impact on park operations and facilities.

Impacts under Alternative 2 (Crane Flat Redevelopment)

Construction- related Impacts. During the reconstruction phase, there would be temporary adverse impacts on facilities management staff addressing traffic concerns and coordinating with the construction contractor.

Impact Significance. Local, short- term, minor, adverse impact.

Operation- related Impacts. Under Alternative 2, the Yosemite Institute would redevelop the Crane Flat campus. The new campus would have nearly universal ADA access and would meet all NFPA standards. Rescue and maintenance vehicles/equipment would be able to quickly access the area in response to emergencies.

Under this alternative, the number of students and staff at the campus would roughly double in size, resulting in increased campus- generated visitation to the Tuolumne Grove of Giant Sequoias and nearby meadows and forests. This increase in the number of people regularly using the campus and surrounding area could result in the creation of new informal trails and the deterioration of existing ones in meadows and nearby forest areas, and otherwise increase adverse impacts on sensitive natural resources in the campus vicinity. The application of mitigation measures, such as limiting students to existing trails only, would reduce the magnitude of this effect on resource protection staff.

The redevelopment of Crane Flat would not affect the interpretation services division. Although the increased campus capacity would result in an increase in campus- generated visitation to the park, campus instructors would be accompanying students and providing interpretive services.

Under Alternative 2, new and upgraded facilities and infrastructure would replace aging facilities at the Crane Flat campus, which would reduce adverse effects on facilities management staff. Replacement of the existing wastewater, solid waste, and electrical generation systems with a new onsite package wastewater treatment plant and comprehensive waste management (with recycling) and photovoltaic array would reduce existing demand on facilities management staff for maintenance and repair services. Although these new utilities would require initial installation and ongoing maintenance (including increased solid waste disposal services), the long- term demand on facilities management staff is expected to be less than that currently imposed by the aging utility infrastructure at the campus. The existing parking lot at the campus is below the grade of Tioga Road, which makes snow removal at this facility by NPS staff more difficult. Raising the parking lot to the grade of Tioga Road would substantially reduce this snow- removal operation, thereby reducing the effect on facilities management staff.

Under Alternative 2, the aging facilities at the Crane Flat campus would be replaced with new and upgraded facilities and infrastructure, which would reduce adverse effects on visitor protection staff. Under this alternative, installation of a new water storage tank suitable for fire protection is included. This tank would meet fire protection water flow requirements, which currently are not met for the existing facility. The Yosemite Fire Prevention Office would review all plans, using the latest versions of policies, codes, and standards in the plan review process. All site structures would be constructed according to current Yosemite Safety Policy on Fire Prevention, the NFPA Fire Prevention Code, the International Building Code, and all other applicable regulations and standards. All buildings would be equipped with automatic sprinkler systems, meeting applicable federal regulations as well as all Yosemite Fire Prevention Office codes and standards. Site design would include appropriate emergency access and fires lanes. Implementation of Alternative 2 would increase access to the campus in compliance with current regulations, resulting in a beneficial effect on visitor protection staff in the event emergency access to the campus is necessary.

Impact Significance. Local, long- term, minor, beneficial impact.

Conclusion. The redeveloped campus would offer modern, up- to- code, energy- efficient facilities and infrastructure that would result in a beneficial impact to park operations and facilities over the long term.

Impacts under Alternative 3 (Henness Ridge Center)

Construction- related Impacts. The park would need to determine a new location for the sand shed that was located at Henness Ridge until 2009. This is anticipated to result in a local, short- term, minor, adverse impact on park operations. During the construction phase, there would be a local, short- term, minor, adverse impact on facilities management staff addressing traffic concerns and coordinating with the construction contractor. The non- potable water system at Chinquapin would be replaced with a new potable groundwater system. The historic redwood water tank would not be removed or disturbed (other than structural stabilization after discontinued use).

Impact Significance. Local, short- term, minor, adverse impact

Restoration- related Impacts. During the restoration of Crane Flat, there would be temporary adverse impacts on all four basic park operations. Visitor protection and facilities management staff would need to address safety and traffic concerns and coordinate with the demolition contractor. Resource protection staff would coordinate the habitat restoration and enhancement activities at the site, and interpretation staff would develop interpretative exhibits highlighting cultural and natural resources to be installed at Tuolumne Grove.

Impact Significance. Local. short- term, minor, adverse impact.

Operation- related Impacts. Under Alternative 3, a new campus location and program at Henness Ridge would be established. The new campus would be universally ADA accessible and would meet all NFPA standards. Rescue and maintenance vehicles/equipment could quickly access the area in response to emergencies.

Building a new campus facility would roughly triple the number of students and staff at the campus, resulting in increased campus- generated visitation to Mariposa Grove of Giant Sequoias, Badger Pass Ski Area, and nearby meadows and forests. This increase in the number of people regularly using the new site and surrounding area could result in the creation of new informal trails and the deterioration of existing ones in meadows and nearby forest areas, and otherwise increase adverse impacts on sensitive natural resources in the campus vicinity. The application of mitigation measures, such as limiting students to existing trails only, would reduce the magnitude of this effect on resource protection staff.

Under Alternative 3, there would be no effect on the interpretation services division. Although the increased campus capacity would result in an increase in campus- generated visitation to the park, campus instructors would be accompanying students and providing interpretive services.

The new campus at Henness Ridge site would be built with the newest state- of- the- art facilities and infrastructure, which would reduce adverse effects on facilities management staff. Initially, the construction phase of the campus would have some adverse impact on facilities management staff, but once the campus is built, the amount of time staff would need to spend on maintenance and repairs would be greatly reduced. Building the new campus with an onsite package wastewater treatment plant, comprehensive waste management, an onsite photovoltaic cell solar power, and an offsite groundwater system at Chinquapin would reduce demand on facilities management staff. Although these new facilities and utilities would require initial installation and ongoing maintenance (including increased solid waste disposal services), the long- term demand on facilities management staff is expected to be less than that currently imposed because the technology used is anticipated to require minimal maintenance.

Under Alternative 3, a new campus at Henness Ridge site would be built with the newest state- of- the- art facilities and infrastructure, which would reduce adverse effects on visitor protection staff. This alternative includes construction of a new potable water system with water treatment inside the historic Chinquapin garage. This installation of a new water storage tank that could hold up to 200,000 gallons would meet fire protection standards and potable water requirements for the new campus. Also included is a new groundwater source in Indian Creek and new transmission mains.

The presence of a campus at Henness Ridge would not significantly alter the way that the park currently manages fire in the adjacent wilderness. Fire management would probably implement more frequent fuels reduction treatments and prescribed burns in cooler seasons. However, the presence of a fire house on site is anticipated to have beneficial impacts to visitor protection staff. The Yosemite Fire Prevention Office would review all plans using the latest versions of policies, codes, and standards in the plan review process. All site structures would be constructed according to current Yosemite Safety Policy on Fire Prevention, the NFPA Fire Prevention Code, the International Building Code, and all other applicable regulations and standards. All buildings would be equipped with automatic sprinkler systems, meeting applicable federal regulations as well as all Yosemite Fire Prevention Office codes and standards. Site design would include appropriate emergency access and fires lanes.

Impact Significance. Local, long- term, minor, beneficial impact.

Conclusion. Impacts to park operations under Alternative 3 would be similar to those described under Alternative 2. The new campus would offer modern, up- to- code, energy- efficient facilities and infrastructure that would result in a beneficial impact to park operations and facilities over the long term. The restoration of Crane Flat would have temporary adverse impacts to park operation, but once completed, is anticipated to have negligible impacts to park operations.

TRANSPORTATION

Affected Environment

Yosemite National Park has four main entrances (Big Oak Flat, Arch Rock, Tioga Pass, and South), with three highways providing the primary access (Highways 120, 140, and 41). Highway 120 is also known as Tioga Road within the park and provides primary access from the Big Oak Flat entrance to the Tioga Pass entrance. Highway 140 is also referred to as El Portal Road and provides access from the El Portal entrance (Arch Rock) to the Yosemite Valley. Highway 41 is also known as Wawona Road and provides access from the South entrance through Wawona to the Yosemite Valley. Crane Flat is located off of Highway 120 or Tioga Road in the western portion of the park. Henness Ridge is located off of Wawona Road in the southwestern portion of the park.

The road system within Yosemite National Park is in fair physical condition, but is below NPS standards for current and projected future use (NPS 1989). The segment of Tioga Road between Crane Creek and the Tamarack Flat Campground, which passes Crane Flat, has been identified as needing repair but has been assigned relatively low priority.

Traffic on the major roadways and at key intersections in the vicinity of Crane Flat and Henness Ridge was characterized using a level of service (LOS) rating. LOS is a qualitative measure of traffic operating conditions, whereby a letter grade A through F is assigned to an intersection or roadway segment representing progressively worsening traffic conditions. LOS A through C represents stable flow of traffic with minimal delays. LOS D approaches unstable flow with more noticeable congestion. LOS E is considered unstable flow, but with acceptable delays, whereas LOS F is forced flow, resulting in unacceptable conditions for most drivers.

LOS was assessed during peak hours and represents the highest anticipated traffic counts for a period of two hours. The peak hours were identified as between 7 and 9 a.m. and 4 and 6 p.m. because they reflect the anticipated arrivals and departures associated with the Yosemite Institute's educational program schedule (Omni- Means 2009).

Crane Flat Setting

Crane Flat is located on Tioga Road approximately 0.5 mile north of the junction of Tioga Road and Big Oak Flat Road (see Figure 1- 2 in Chapter 1). Both roads are maintained by the National Park Service and experience heavy use during summer when visitation is at its peak. Except for the segment between Big Oak Flat Road and Crane Flat, Tioga Road is closed during winter (typically late fall through late spring) because the road is not cleared of snow during this period. Big Oak Flat Road provides an access from the Big Oak Flat entrance to Crane Flat and the Yosemite Valley.

Two key intersections occur near Crane Flat: Tioga Road/Tuolumne Grove and Tioga Road/Big Oak Flat Road. According to traffic counts during the summer 2008, the Tioga Road/Tuolumne Grove intersection operates at LOS A during a.m. and p.m. peak hours (Omni- Means 2009). The Tioga Road/Big Oak Flat Road intersection operates at LOS A during a.m. peak hours and LOS B during p.m. peak hours. Even with the closure of Tioga Road during the winter months, the operation of these intersections during the winter months can be assumed to be the same or better because of reduced traffic volumes.

Henness Ridge Setting

The Henness Ridge site is located at the intersection of Henness Ridge Road and Wawona Road approximately 0.5 mile south of the Wawona Road/Glacier Point Road intersection (Chinquapin). Henness Ridge Road provides access to Yosemite West, a private residential community, to the west of Henness Ridge. Wawona Road is well- maintained year- round, heavily traveled, and has a speed limit of 35 to 40 mph.

Glacier Point Road, which begins at Chinquapin, parallels the Yosemite Valley rim and provides access to spectacular views of the Valley and the Sierra Crest. This road provides vehicle access to Glacier Point, Badger Pass Ski Area, and some of the wilderness in the southern half of the park, including access to trailheads such as Panorama Trail, the Pohono Trail, and Taft Point. This makes it a popular entry point for hikers, backpackers, campers, horseback riders, and cross- country skiers. The Glacier Point Road closes due to snow, usually from sometime in November through late May or early June. From approximately mid- December through March, the first 5 miles of this road are open (to Badger Pass Ski Area).

Two key intersections occur near the Henness Ridge site: Wawona Road/Glacier Point Road and Wawona Road/Henness Ridge Road. According to traffic counts during the summer 2008, both intersections operate at LOS A during the a.m. peak hours and LOS B during the p.m. peak hours (Omni- Means 2009). The operation of these intersections during the winter months can be assumed to be the same or better because of reduced traffic volumes, though on occasion congestion occurs as drivers chain up during storm events to reach Badger Pass Ski Area.

Environmental Consequences

A Transportation Impact Analysis Report (TIAR) was prepared (Omni- Means 2009). The TIAR analyzed the worst- case scenario for traffic: peak summer traffic volumes and LOS, 250 beds at the campus, and students/instructors traveling to the Yosemite Valley on Wednesdays. The traffic scenarios for each alternative are as follows:

- Alternative 1 (No- Action Alternative) – Existing plus approved/pending site conditions
- Alternative 2 (Crane Flat Redevelopment) – Existing plus approved/pending actions plus site conditions (focusing on the two intersections near the Crane Flat site and the two Crane Flat driveways.
- Alternative 3 (Henness Ridge Center) – Existing plus approved/pending actions plus site conditions (focusing on the two intersections near the Henness Ridge site and the Henness Ridge driveway)
- Alternative 1 Cumulative – Year 2030 conditions
- Alternatives 2 and 3 Cumulative – Year 2030 plus site conditions (focusing on forecasted traffic volumes for the year 2030 and concurrent operation of both the Crane Flat and Henness Ridge sites; a worst- case scenario in terms of increased traffic)

Intensity Level Definitions

The Federal Highway Administration (FHWA) has designated LOS C as the minimum acceptable LOS standard on federal facilities; however, discussions with the FHWA indicated that LOS standards vary by facility type (i.e., urban freeways, mountainous roads, etc.). In this report, a peak- hour LOS C is taken as the threshold for acceptable traffic operations at the study intersections. Impact threshold definitions for traffic are as follows:

Negligible: There would be no change in the number of vehicles. Road intersections would operate at LOS A or LOS B.

Minor: There would be a small increase in the number of vehicles. Road intersections would experience a decrease to LOS B.

Moderate: Increases in the number of vehicles would be apparent. Road intersections would experience a decrease to LOS C.

Major: Increases in the number of vehicles would be noticeable to all motorists. Road intersections would experience a decrease to LOS D or F.

Impairment

Definition

Impairment is not applicable to this topic.

Impacts under Alternative 1 (No- Action Alternative)

Under the No- Action Alternative, the campus at Crane Flat would remain in its existing condition, with no new development or expansion of campus operations. Traffic volumes and patterns would remain unchanged. No construction- related impacts would occur. Operation- related impacts would be limited to the contribution of traffic on local roadways from campus operations.

Operation- related Impacts on Transportation. Campus users access the existing environmental education campus at Crane Flat via Tioga Road and Big Oak Flat Roads. Traffic volumes on these roadways are considered acceptable based on summer 2008 traffic counts (LOS A and B), and traffic from campus operations is not likely noticeable compared with traffic from other park visitors.

Projected future traffic at the park's entrances based on approved and pending development in the park (see Appendix H) would be slightly increased, resulting in a slight delay for visitors at the entrances. Three entrances would be used at a greater frequency because of their proximity to the approved and pending development actions: Big Oak Flat Entrance, South Entrance, and the Arch Rock Entrance. Campus operations would contribute to this delay when campus users enter the park, particularly at the Big Oak Flat entrance; however, traffic from campus users would not likely be noticeable compared with the total traffic volumes at the entrance.

Impact Significance. Local, long- term, negligible, adverse impact.

Conclusion. No construction- related impacts would occur. Operation- related impacts would include negligible traffic impacts from campus operations.

Impacts under Alternative 2 (Crane Flat Redevelopment)

Under Alternative 2, the Crane Flat campus would be redeveloped, including removal of existing buildings, construction of new buildings, and increasing campus operations and use. Construction- related impacts would result from construction personnel, equipment, and materials traveling to and from the site. Operation- related impacts would result from campus users traveling to and from the site.

Construction- related Impacts on Transportation. Construction crews and support staff would commute via Tioga Pass Road, entering the park via Highway 41, Highway 140, or Highway 120. A minimum of 10 vehicle trips per day with a maximum of 32 vehicle trips per day would be anticipated during the construction period based on the estimated number of construction personnel. Construction traffic would not be expected to affect traffic volumes during the a.m. peak hours on local roads around Crane Flat because they would likely be at Crane Flat before 7 a.m. to begin construction. However, construction crews would likely be leaving Crane Flat at the beginning of the p.m. peak hours (4 p.m.) and would contribute to traffic volumes during the p.m. peak hours. Although temporary in nature, construction traffic at the Tioga Road/Tuolumne Grove and Tioga Road/Big Oak Flat Road intersections would likely be noticeable to park visitors and could reduce the LOS at these intersections to LOS C. A further reduction in LOS is not anticipated based on the estimated number of construction trips per day. This reduction to LOS C would result in a moderate adverse impact.

Vehicle trips between Crane Flat and the secondary staging area, Pohono Quarry, would occur occasionally, when additional construction equipment is needed or when materials are removed from Crane Flat and taken to be sorted for reuse, recycling, and disposing. Vehicle trips are anticipated to occur before the a.m. peak hours, for construction equipment to be in place for the construction crews, or in the early afternoon, prior to the p.m. peak hours, for the construction crews to complete their workday by 4 p.m. Equipment traffic at the intersections in the Crane Flat area would not be noticeable because these trips would be minimal and infrequent. Therefore, vehicle trips between the staging area and Crane Flat would have a negligible effect on intersection operations during construction.

Construction equipment would need to be brought to Crane Flat and Pohono Quarry at the start of construction and removed at the end of construction. Vehicles carrying construction equipment would use the same routes as the construction crew members. The vehicles hauling construction equipment would increase vehicle numbers in the park only during delivery and pick- up, a total of two days, and can be scheduled to arrive outside of a.m. or p.m. peak hours. This increase in traffic would have a negligible effect on intersection operations.

Impact Significance. Local, short- term, negligible to moderate, adverse impact.

Operation- related Impacts on Transportation. Campus redevelopment would increase campus operations and result in increased vehicle trips to and from the campus. Campus use is estimated to result in nine bus round trips per week for students in buses (assuming 50 students per bus), four round trips per day for instructors/employees (assuming carpools), and five delivery round trips per week. These trips would contribute to traffic volumes in the vicinity of Crane Flat and at the park's entrances (primarily Big Oak Flat). The total estimated number of trips per day would not contribute noticeable traffic to the park entrances. Total trip generation from the campus is minimal compared with the total trips occurring on a daily basis within the park, especially based on summer peak hour traffic counts. The contribution of campus traffic to traffic on roadways in the Crane Flat vicinity would not reduce the LOS of Tioga Road, Tuolumne Grove, or Big Oak Flat Road. In addition, the total estimated number of trips per day would not contribute noticeable traffic to the park entrances.

Impact Significance. Local, long- term, negligible, adverse impact.

Conclusion. Construction- related impacts would include moderate traffic impacts from construction personnel and negligible traffic impacts from transportation of equipment and materials. Operation- related impacts would include negligible traffic from campus operations.

Impacts under Alternative 3 (Henness Ridge Center)

Under Alternative 3, the Crane Flat Campus would be restored to essentially natural conditions and a new campus location and program at Henness Ridge would be established. Construction- related impacts would result from construction personnel, equipment, and materials traveling to and from the site. Operation-related impacts would result from campus users traveling to and from the site.

Construction- related Impacts on Transportation. Construction crews and support staff would commute via Wawona Road, entering the park via Highway 41 or Highway 140. A minimum of 10 vehicle trips per day with a maximum of 32 vehicle trips per day would be anticipated during the construction period based on the estimated number of construction personnel. Construction traffic would not be expected to affect traffic volumes during the a.m. peak hours on local roads around Henness Ridge because they would likely be at Henness Ridge before 7 a.m. to begin construction, although Yosemite West residents may notice an increase in traffic and general activity during the construction period. Construction crews would likely be leaving

Henness Ridge at the beginning of the p.m. peak hours (4 p.m.) and would contribute to traffic volumes during the p.m. peak hours. Although temporary in nature, construction traffic at the Wawona Road/Glacier Point Road and Wawona Road/Henness Ridge Road intersections would likely be noticeable to park visitors and Yosemite West residents and could reduce the LOS at these intersections to LOS C. A further reduction in LOS is not anticipated based on the estimated number of construction trips per day. This reduction to LOS C would result in a moderate, adverse impact. Installation of water and electrical mains in the shoulder/edge of pavement along Wawona Road (Highway 49) from Chinquapin to Henness Ridge may affect motorists on this stretch of Wawona Road.

Vehicle trips between Henness Ridge and the secondary staging area, Pohono Quarry, would occur occasionally, when additional construction equipment is needed or when materials are removed from Henness Ridge and taken to be sorted for reuse, recycling, and disposing. Vehicle trips are anticipated to occur before the a.m. peak hours, for construction equipment to be in place for the construction crews, or in the early afternoon, prior to the p.m. peak hours, for the construction crews to complete their workday by 4 p.m. Equipment traffic at the intersections in the Henness Ridge area would not be noticeable because these trips would be minimal and infrequent. Therefore, vehicle trips between the staging area and Henness Ridge would have a negligible effect on intersection operations during construction.

Construction equipment would need to be brought to Henness Ridge and Pohono Quarry at the start of construction and removed at the end of construction. Vehicles carrying construction equipment would use the same routes as the construction crew members. The vehicles hauling construction equipment would increase vehicle numbers in the park only during delivery and pick- up, a total of two days, and can be scheduled to arrive outside of a.m. or p.m. peak hours. This increase in traffic would have a negligible effect on intersection operations.

Impact Significance. Local, short- term, negligible to moderate, adverse impact.

Operation- related Impacts on Transportation. Establishment of a new campus at Henness Ridge would increase traffic volumes on roadways in the vicinity during campus operations. Campus use is estimated to result in 15 bus round trips per week for students in buses (assuming 50 students per bus), seven round trips per day for instructors/employees (assuming carpools), and five delivery round trips per week. These trips would contribute to traffic volumes in the vicinity of Henness Ridge as well as at the park's entrances (primarily South and Arch Rock). The total estimated number of trips per day would not contribute noticeable traffic to the park entrances. Total trip generation from the campus is minimal compared with the total trips occurring on a daily basis within the park, especially based on summer peak hour traffic counts; however, any increase in traffic would likely be noticeable to Yosemite West residents because their primary access route (Henness Ridge Road) would serve as the primary access for the Henness Ridge campus. Although the contribution of campus traffic to traffic on roadways in the Henness Ridge vicinity would not reduce the LOS of most roadways, the intersection of Wawona Road/Henness Ridge Road would experience a decrease in LOS from A to B during a.m. peak hours (based on summer traffic counts).

Impact Significance. Local, long- term, minor, adverse impact.

Restoration- related impacts on Transportation. Under Alternative 3, the Crane Flat campus site would be restored to essentially natural conditions and all YI operations and activities at Crane Flat would cease. Campus closing and restoration would eliminate all traffic generated by the campus on roads in the Crane Flat area. Because total trip generation from the Crane Flat campus is minimal compared with the total trips occurring on a daily basis within the park, the benefit of reduced traffic generation is local.

Impact Significance. Local, long- term, minor, beneficial impact.

Conclusion. Construction- related impacts would include moderate traffic impacts from construction personnel and negligible traffic impacts from transportation of equipment and materials. Operation- related impacts would include minor traffic from campus operations.

LAND USE

Affected Environment

Land use within and adjacent to Yosemite National Park is primarily publicly managed parkland. The gross area within the park's authorized boundary is 747,956 acres. This includes nonfederal ownership totaling 1,736 acres, of which approximately 10 acres are easements. There are 366 privately owned tracts within the park boundaries, totaling 233 acres. Local governments manage 21 tracts within the park boundaries, totaling 1,502 acres.

The NPS *General Management Plan* (1980) divided land within Yosemite National Park into four primary zones and six subzones based on management objectives, resource significance, and legislative constraints. The NPS *General Management Plan* (1980) zoning is broad- based and was meant to give general guidance for future implementation of specific plans. The four primary zones identified in the NPS *General Management Plan* (1980) and their basic management strategies are natural, cultural, development, and special- use. These zones may overlap, and thus management decisions must be based on equal recognition of resources.

Natural Zone

This zone includes lands and waters that are managed to conserve natural resources and ecological processes and to provide for visitor use and enjoyment in ways that would not adversely affect natural environments. This zone includes all lands in the following four subzones: wilderness, environmental protection, outstanding natural features, and natural environment. Areas classified as natural zones make up almost 98% of the park. Almost 95% of Yosemite National Park is designated Wilderness, which includes a small amount of land currently designated as potential Wilderness additions.

Cultural Zone

This zone is managed for the preservation, protection, and interpretation of cultural resources and their settings while providing for visitor use and enjoyment. This zone is composed of significant architectural, historic, and archeological resources that would be preserved unless such action causes unacceptable alteration of natural resources and/or processes. These areas are identified within two subzones, the historic and archeological subzones. In 1980, it was estimated that areas classified as cultural zones make up almost 3% of the park. Since that time, both cultural landscapes and TCPs have been included, as have many additions as listings or nominations to the NRHP. To date, only a small portion of the park has been surveyed.

Development Zone

This zone includes lands managed to provide and maintain roads and facilities serving visitors and park operations. Areas classified as development zones make up about 2% of the park. No subzones are within the development zone.

Special- use Zone

This zone includes lands and waters used for activities that are not appropriate in other zones. The reservoir subzone includes Lake Eleanor and Hetch Hetchy Reservoirs, which are managed by the San Francisco Water Department under the terms of the Raker Act. The special- use zone also includes private parcels in Wawona, Foresta, and Aspen Valley, as well as parcels managed by the City and County of San Francisco. Areas classified as special- use zones make up less than 0.5% of the park. No subzones are included within the special- use zone.

Crane Flat Setting

Two management zones, as designated by the NPS *General Management Plan* (1980), are present in the vicinity of the existing environmental education campus at Crane Flat: the development zone and natural zone, including the Wilderness subzone. No special- use or cultural zones occur within the vicinity of Crane Flat.

Development Zone. A small development zone, as designated by the NPS *General Management Plan* (1980), occurs at Crane Flat and includes the environmental education campus, the water tank located east along Tioga Road that serves the campus, the Tuolumne Grove of Giant Sequoias parking lot, an NPS employee residence near the Tuolumne Grove parking lot, and the gas station and convenience store located at the intersection of Tioga Road and Big Oak Flat Road.

Natural Zone and Wilderness Subzone. The environmental education campus at Crane Flat is surrounded almost entirely by the Wilderness subzone. Facilities located in the Wilderness subzone in the vicinity of the environmental education campus include the groundwater pump in Crane Flat Meadow and foundations from the historic Blister Rust Camp. Nearby Tuolumne Grove and Merced Grove are considered outstanding natural features and are parts of the natural zone. Trails are abundant adjacent to the campus.

Crane Flat Development Concept. The NPS *General Management Plan* (1980) includes a Crane Flat Development Concept that encompasses the area of the environmental education campus at Crane Flat (NPS 1980). Crane Flat is a minor service area that provides opportunities for quiet, pleasant camping in the summer, and nordic skiing and other snow- play activities in the winter.

Stated goals and actions of the NPS *General Management Plan* (1980) Crane Flat Development Concept include the following:

Visitor- Use Goals

- Increase opportunities for camping
- Provide adequate support facilities to accommodate existing levels of winter use
- Provide experimental day parking area for Yosemite Valley visitors

Visitor- Use Actions

- Increase size of campground from 164 to not more than 200 sites
- Renovate and winterize the store and provide cross- country ski rental and snow- play equipment rental
- Keep gas station open all year

- Provide parking for 200 cars for winter activities; use in summer as experimental staging area for Yosemite Valley day visitors
- Provide comfort station and ranger contact shelter at parking area

Park Operations Goals

- Improve utilities to achieve state and federal standards
- Retain essential employee housing

Park Operations Actions

- Drill well(s) to provide a reliable, year- round domestic water source
- Construct sewage treatment facility
- Provide commercial electrical power through a commercial hookup from Hodgdon Meadow via South Landing Road
- Provide enclosed storage for sand and sand truck at South Landing for winter snow operations
- Retain existing ranger residence
- Retain old Blister Rust Camp

Henness Ridge Setting

Two management zones, as designated by the NPS *General Management Plan* (1980), are present in the vicinity of Henness Ridge: the development zone and natural zone, including the Wilderness subzone.

Development Zone. A small development zone, as designated by the NPS *General Management Plan* (1980), occurs at Chinquapin–Henness Ridge near the junction of Glacier Point Road and Wawona Road. Chinquapin includes a ranger residence and sand/equipment storage. Henness Ridge is located to the south of Chinquapin between the junction of Wawona Road and Yosemite West. Henness Ridge is a generally undisturbed forested area except for traversing utility lines and various historic railroad beds that service private inholdings. Yosemite West is a residential area located behind a hill to the west of the proposed Henness Ridge site.

Natural Zone and Wilderness Subzone. Henness Ridge is surrounded by the natural zone with the Wilderness subzone to the northeast across the Wawona Road. The historic railroad beds near the proposed Henness Ridge site serve as hiking trails within the natural zone. Access to the Wilderness zone is located at a trailhead across from Henness Ridge on the Wawona Road.

Glacier Point Road Corridor. The NPS *General Management Plan* (1980) includes plans for a Glacier Point Road Corridor that encompasses the Chinquapin–Henness Ridge area (NPS 1980). Chinquapin- Henness Ridge is a minor service area that provides parking and telephone services for visitors traveling between the Yosemite Valley, Wawona, and Glacier Point.

Stated goals and actions of the Chinquapin- Henness Ridge area in the *General Management Plan* include the following:

Visitor- Use Goals

- Remove intensive development

Visitor- Use Actions

- Remove gas station and comfort station
- Redesign intersection and restore site

Park Operations Goals

- Improve efficiency of road maintenance during winter months
- Remove nonessential housing

Park Operations Actions

- Construct a covered sand storage structure at Chinquapin- Henness Ridge
- Remove residence

Environmental Consequences

Intensity Level Definitions

Impacts to land use were evaluated using the process described in the introduction to this chapter. Impact threshold definitions for land use are as follows:

Negligible: Land use would not be affected, or effects would not be measurable. Any effects to any of the four primary zones would be slight and short- term.

Minor: Effects to land use, for example a change from undeveloped forest habitat to a park facility, would be detectable. If mitigation were needed to offset adverse effects, it would be relatively simple to implement.

Moderate: Effects to land use would be readily apparent. Mitigation would probably be necessary to offset adverse effects.

Major: Effects to land use would be readily apparent and would substantially change any of the four primary zones in Yosemite National Park. Extensive mitigation would probably be necessary to offset adverse effects, and its success could not be guaranteed.

Impairment

Definition

Impairment is not applicable to this topic.

Impacts under Alternative 1 (No- Action Alternative)

Operation- related impacts on Land Use. Under the No- Action Alternative, the campus at Crane Flat would remain in its existing condition. Day- to- day educational activities and operations would continue at the campus and surrounding areas. There would be no change in land use. Only continued minor use of the development zone, natural zone, and Wilderness subzone would occur.

Impact Significance. Local, long- term, negligible, adverse impact.

Conclusion. Maintaining the existing campus under the No- Action Alternative would have local, long- term, negligible, adverse effects on land use. Under Alternative 1, land use resources in Yosemite National Park would not be impaired.

Impacts under Alternative 2 (Crane Flat Redevelopment)

Construction- related impacts on Land Use. During the reconstruction phase, there would be a local, short- term, negligible, adverse impact on land use because all campus reconstruction occurs within the development zone and no designated land use zone changes occur. The development zone is designated to provide visitor facilities and the construction of these facilities.

Impact Significance. Local, short- term, negligible, adverse impact.

Operation- related impacts on Land Use. Under Alternative 2, the Yosemite Institute would redevelop the Crane Flat campus entirely within the development zone, although the groundwater pump in Crane Flat Meadow and foundations from the historic Blister Rust Camp would remain in their existing condition within the Wilderness subzone. Because all campus reconstruction occurs within the Development Zone, impacts to land use are considered to be negligible.

Redevelopment plans for the Crane Flat Campus would be generally consistent with the stated goals and actions of the NPS *General Management Plan* (1980) Crane Flat Development Concept, such as retaining some historic structures of the old Blister Rust Camp and improving campus utilities to achieve state and federal standards. The sustainable campus design features (that reduce water and energy consumption) and a new onsite wastewater treatment plant would also be consistent with the Crane Flat Development Concept. Because the campus reconstruction is consistent with the Crane Flat Development Concept, the impacts on land use are considered to be negligible.

Impact Significance. Local, long- term, negligible, adverse impact.

Conclusion. Adverse effects to land use under Alternative 2 would be negligible because all campus reconstruction would occur within the Development Zone and is consistent with the Crane Flat Development Concept. The presence of additional students, chaperones, and staff would occur; however, this does not change the land use zone and is consistent with the goals and objectives stated for the development zone. No adverse effects to land use in the natural zone would occur as a result of campus reconstruction. Expected water consumption and nearby trail use increases are covered as adverse impacts in other sections of the EIS. Redevelopment directed towards the southwest would provide a minor, long- term, beneficial impact for the sensitive meadow areas to the northeast.

Impacts under Alternative 3 (Henness Ridge Center)

Construction- related impacts on Land Use. During the construction phase, there would be a local, short- term, negligible, adverse impact on land use because development would remove the modern sand storage structure called for in the NPS *General Management Plan* (1980) for the Glacier Point Road Corridor. However, because campus development is located entirely within the development zone and is consistent with the development zone uses, adverse impacts are considered negligible.

Impact Significance. Local, short- term, negligible, adverse impact.

Restoration- related impacts on Land Use. Restoration of Crane Flat, as described in Chapter 2, will result in removal of all structures and parking areas associated with the campus. The site would be restored to natural conditions using native vegetation. The site would be restored to natural conditions using native vegetation, and would be reclassified as a natural zone. In addition, 64 acres of new Wilderness along Indian Crekk (facilitated by the water utility improvements at Chinquapin) would result in that area being reclassified as a Wilderness subzone.

Impact Significance. Local, long- term, minor, beneficial impact.

Operation- related impacts on Land Use. The stated goals and actions of the NPS *General Management Plan* (1980) Glacier Point Road Corridor recommend removing the intensive development and nonessential housing that existed at Chinquapin. However, the underlying development zone allowance for such activities results in minor, adverse impacts. The disturbance associated with the new campus at Henness Ridge would result in a local, long- term, minor, adverse impact to land use. No new trails or other structures would be built within the natural zone or Wilderness subzone.

Impact Significance. Local, long- term, minor, adverse impact.

Conclusion. Effects to land use in the development zone would be long- term, minor, direct, and adverse because development of the new campus at Henness Ridge is inconsistent with the goals and actions stated in the Glacier Point Road Corridor. However, because the new campus location lies entirely within the development zone that allows for provision of visitor facilities, adverse impacts to land use are minor. Restoration under this alternative at Crane Flat and Indian Creek (Old Glacier Point Road) would result in these areas being recategorized as "natural zones."

COMMUNITY VALUES

Affected Environment

The community values discussion summarizes contemporary social issues in three communities nearest the proposed development: El Portal, Foresta, and Yosemite West. These three communities are within or on the fringe of the park, approximately 15 to 20 miles from Yosemite Valley. Yosemite Valley is in the heart of Yosemite National Park, and serves as the main point of entry for park visitors to many of the park's most famous landmarks, such as El Capitan, Half Dome, and Yosemite and Bridalveil Falls.

Yosemite West

Yosemite West is a small community whose summer population rarely exceeds 500 individuals. The subdivision is primarily made up of permanent residents, retirees, renters, and second- home owners who spend weekends and summers there. Because Yosemite West can only be accessed through the park via one road, residents have a greater sense of privacy from park visitors than those living in Yosemite Valley.

The Yosemite West community has limited commercial or other support facilities. Approximately 35 miles south of the community in the town of Oakhurst are the nearest gas stations, schools, restaurants, and medical center. Many of the community's permanent residents are small- business owners who run bed and breakfast inns from their home. Some NPS and concessionaire employees make Yosemite West their permanent home.

El Portal

El Portal is a small community with a population of 700. Although the community is located along Highway 140, outside the western boundary of the park, there are limited commercial or other support facilities. Most residents are employed by the National Park Service, concessionaires, or park partners.

The El Portal Administrative Site was established by Public Law 85- 922 in 1958; however, the site did not become part of the park. The demographic composition of El Portal residents is different than cohorts living in other areas of the park; more residents tend to live in owned or rented (nongovernmental) housing, are married, and have children. Therefore, El Portal is a more family- oriented community than Yosemite Valley (for residents). In addition, most concessionaire employees are long- term, mid- level employees, whereas concessionaire employees living in Yosemite Valley tend to be upper- level manager and seasonal employees.

El Portal has a small grocery store, library, child care facility, elementary school (grades K- 8), high school (grades 9- 12), and a gas station. The nearby Merced River is a recreational attraction for residents and visitors, offering residents river rafting and kayaking opportunities in the spring and swimming in the summer.

Foresta

Foresta is a very small community of 25 to 50 residents located within the boundaries of the park. The community includes 12 permanently occupied single- family homes; another 33 homes are located in the community for seasonal, vacation, and rental units. The residents that do occupy homes in this community are year- round residents, making Foresta a very tight- knit community. This small, very isolated community lacks any community amenities in terms of commercial or public services, and is approximately a 20- minute drive from Yosemite Valley. The Stanislaus National Forest is just outside the park boundary and west of Foresta. Residents enjoy hiking, biking, swimming, and bird watching as recreational opportunities in the immediate area.

Environmental Consequences

Intensity Level Definitions

Impacts to community values were evaluated using the process described for all impact topics in this document. The discussion of impacts to community values is a qualitative discussion and is based on community perceptions and values that each community places on preservation of existing conditions versus development for purposes of enhancing visitor experiences, and how each alternative accommodates those values. Impact threshold definitions for community values are described below:

Negligible: Community values would not be affected, or effects would not depart measurably from the baseline conditions.

Minor: Effects to community values would be detectable, but would not affect the character of this resource.

Moderate: Effects to community values would be readily apparent and have a moderate impact on the community composition and character of a given area.

Major: Effects to community values would be readily apparent and would substantially change community values permanently.

Impairment

Definition

Impairment is not applicable to this topic.

Impacts under Alternative 1 (No- Action Alternative)

Operation- related Impacts. Under the No- Action Alternative, the campus at Crane Flat would remain in its existing condition and although necessary maintenance and repairs would continue, no major undertakings are planned. Both short- and long- term impacts to community values under the No- Action Alternative are not expected to depart from the current conditions; therefore, no substantive changes to community character and values are expected. Environmental education campus workers would continue to reside in the communities of El Portal, Foresta, and Yosemite West. Therefore, impacts to community values under Alternative 1 are expected to be negligible.

Impact Significance. Local, long- term, negligible, adverse impact.

Conclusion. Under this alternative, the existing character of communities such as El Portal, Foresta, and Yosemite West would not change. There would be local, long- term, negligible, adverse impacts under the No- Action Alternative.

Impacts under Alternative 2 (Crane Flat Redevelopment)

Construction- related Impacts. During the redevelopment phase, there would be no impact on community values.

Impact Significance. No impact.

Operation- related Impacts. Under Alternative 2, Yosemite Institute would redevelop the Crane Flat campus. The Yosemite Institute proposes a ratio of approximately 14 students per one instructor; therefore, the ability to accommodate an additional 78 students would result in additional five to six instructors at the Crane Flat campus. The number of employees residing offsite would be similar to Alternative 1, because the addition of five to six instructors for increased student capacity would be housed with increased staff housing options on campus; these additional staff would not require offsite housing. The regional and local housing supply or demand would not be affected by the modification of the existing campus; the effect on local and regional housing would be similar to existing conditions. Environmental education campus employees live primarily in El Portal, but also in Yosemite West and Foresta. The character and composition of these communities is not expected to change measurably beyond current conditions with the addition of five to six instructors to the campus; therefore, impacts to community values under Alternative 2 would be negligible.

Impact Significance. Local, long- term, negligible, adverse impact.

Conclusion. Under this alternative, the existing character of communities such as El Portal, Foresta, and Yosemite West would not change. There would be local, long- term, negligible, adverse impacts under Alternative 2.

Impacts under Alternative 3 (Henness Ridge Center)

Construction- related Impacts. During the development phase, there would be no impact on community values.

Impact Significance. No impact.

Operation- related Impacts. Under Alternative 3, a new campus location and program at Henness Ridge would be established, with closure of the Crane Flat campus. As previously noted, the Yosemite Institute proposes a ratio of approximately 14 students per one instructor; therefore, the ability to accommodate the additional students would result in an additional 11 instructors. The demand for housing at Yosemite West and Wawona could increase, whereas the demand for housing in other communities, such as El Portal, could decrease because of the campus relocation closer to Yosemite West and Wawona. The increased demand at Yosemite West and Wawona would result in a minor, adverse impact on the community character and values of Yosemite West as demand for amenities and services in this community increases. Therefore, this shift in employee residences from El Portal to Yosemite West and Wawona would have local, long- term, minor, adverse effects on community values.

Impact Significance. Local, long- term, minor, adverse impact.

Conclusion. A shift in employee residences from El Portal to Yosemite West would have a local, long- term, minor, adverse impact.

SOCIOECONOMICS

Affected Environment

This section examines the economic conditions in the region affected by the implementation of the proposed alternatives. This region has been characterized in the context of its relationship to the changes at Crane Flat and/or Henness Ridge proposed under each of the proposed alternatives. The discussion of the economic conditions provides a description of current visitor populations, regional socioeconomics (Madera, Mariposa, Mono, and Tuolumne Counties), the park, and local communities.

A socioeconomic profile was prepared for each county in the affected region to provide a general characterization of recent demographic and economic conditions and to determine the baseline statistics to be used in the impact analysis of the alternatives.

The primary data source used to compile the economic baseline was IMPLAN, an economic model that estimates the impacts on a specific economy from changes in spending. The Minnesota IMPLAN Group provides county- specific data on output, income, employment, and other economic variables as part of its input- output system. For information that is not provided by IMPLAN, such as forecasts of employment trends, population, and taxable sales, other data sources were used.

Yosemite National Park encompasses parts of three counties (Madera, Mariposa, and Tuolumne) and borders a fourth (Mono County). For the purposes of this analysis, the affected region is defined as these four counties. Tables 3- 9, 3- 10, 3- 11, and 3- 12 present information on these counties' population and employment.

Madera County

Tourism is a major industry in Madera County, with Yosemite National Park as its main attraction. Another strong industry is agriculture, which makes up more than 22.7% of employment in the county. Primary crops include almonds, grapes, and pistachios. Highway 99, which passes from north to south through the county, is where much of the residential and industrial activities occur (Madera County 2008).

Government is the second largest employer in the county, accounting for 22.5% of employment. Educational and health services (13.0%); trade, transportation, and utilities (11.9%); and natural resource mining and construction (6.4%) are other major industry employers. Between 2002 and 2006, government, agriculture, and natural resource mining and construction showed the largest job growth of any other sector. The only sector that experienced job loss over the same time period was the information sector. All other major industries experienced growth (California Employment Development Department [CEDD] 2007a).

Mariposa County

Recreation and tourism are major industries in Mariposa County. The county's primary recreation area tourist attraction is Yosemite National Park, part of which lies within the county. Other major recreation areas near Mariposa County include the Stanislaus and Sierra National Forests, and the Merced Wild and Scenic River within the jurisdiction of the Bureau of Land Management.

Service- related industries such as leisure and hospitality are central to the county's economy, accounting for 36.5% of employment. Government is another major sector with 35.4% of employment, followed by trade, transportation, and utilities (6.5%); natural resource mining and construction (6.1%);, education and health care (4.7%); and other services (4.3%). Between 2002 and 2006, construction, government, education, and other services experienced the highest rate of job growth, while professional and business services as well as trade transportation and utilities industries experienced job loss over the same time period (CEDD 2007b).

Mono County

Lodging, food and beverage, and other service industries are central to Mono County's economy, which is also bolstered by extensive natural resource and recreational opportunities. Yosemite is located west of the Mono County border. Access into the park (via Tioga Road) is typically closed between November and late May due to snowfall. Approximately 41.8% of employment in the county is provided by leisure and hospitality industries. Mammoth Lakes (located in the southern part of the county) is the center of its winter tourism industry and is the fastest growing community in the county. Related employment is erratic because it depends heavily on the snowfall at the Mammoth Lakes ski resort.

Government is the other major employer in Mono County, accounting for approximately 20.9% of county employment. Other major employment by industry includes trade, transportation, and utilities (11.4%); goods production (8.6%); financial activities (6.4%); and professional and business services (6.4%). Leisure and hospitality, professional and business services, and trade, transportation, and utilities industries experienced the most growth between 2002 and 2006, while federal and state government lost jobs over the same time period (CEDD 2007c).

Tuolumne County

The tourism industry and government sector are of primary importance to the county's economy. Part of Yosemite National Park is within the southeastern portion of Tuolumne County. Columbia State Park, Stanislaus National Forest, Dodge Ridge Ski Area, and Leland Meadows are among the many other state and federal parks and recreational areas in the county. The government sector, accounting for 30.5% of employment, is the largest employer in Tuolumne County, followed by trade, transportation, and utilities (16.2%); leisure and hospitality (12.3%); education and health services (12.2%); and natural resource mining and construction (8.1%).

Between 2002 and 2006, job growth was relatively static, at 5.6%. Government, education, and construction grew the most over the time period, while agriculture, manufacturing, and leisure and hospitality industries experienced job loss (CEDD 2007d).

Population

In 2007, the total population of the affected region was approximately 239,237. Madera County is the most populated county, with approximately 149,916 residents. Mono County has the smallest population of the four counties (approximately 14,055), despite having the greatest land area. Table 3- 9 provides population figures for the four counties. The population of all four counties is predicted to grow steadily through the year 2050 (see Table 3- 10). The per- decade rate of population growth is expected to increase during the first decade of the twenty- first century before declining over the subsequent decades.

Employment

The employment figures include all waged and salaried positions, including full- time and part- time workers in each county. Self- employed workers are not included. According to CEDD Labor Market Information Division estimates, the total civilian labor force residing in the four- county region as of December 2007 was 110,970, of which approximately 102,280 were employed (Table 3- 11). The average unemployment rate is 7% for the region, compared with the state average unemployment rate (5.9%) and the national average (4.8%). Only Mono County is below the state average; however, all four counties are above the national average.

Table 3- 12 provides total county employment estimates by sector, indicating the jobs located within the region. Total employment in the four county region reached 78,150 in December 2007 (CEDD 2007a, 2007b, 2007c, 2007d). These numbers can be used as the baseline for employment conditions from which to evaluate the magnitude of economic impacts to the region.

Table 3-9. County Population, 2000–2007

County	Total Population								Percent Population Change						
	July 1, 2000	July 1, 2001	July 1, 2002	July 1, 2003	July 1, 2004	July 1, 2005	July 1, 2006	July 1, 2007	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007
Madera	124,515	126,969	129,451	134,213	138,640	142,498	146,064	149,916	1.97%	1.95%	3.68%	3.30%	2.78%	2.50%	2.64%
Mariposa	16,984	17,199	17,389	17,680	17,733	17,942	18,187	18,356	1.27%	1.10%	1.67%	0.30%	1.18%	1.37%	0.93%
Mono	12,936	13,211	13,352	13,458	13,648	13,717	14,019	14,055	2.13%	1.07%	0.79%	1.41%	0.51%	2.20%	0.26%
Tuolumne	54,713	55,518	56,133	56,648	56,686	56,816	56,882	56,910	1.47%	1.11%	0.92%	0.07%	0.23%	0.12%	0.05%

Source: California Department of Finance 2007

Table 3-10. County Population Projections, 2000–2050

County	Population Projections					
	2000	2010	2020	2030	2040	2050
Madera	124,696	162,114	212,874	273,456	344,455	413,569
Mariposa	17,150	19,108	21,743	23,981	26,169	28,091
Mono	13,013	14,833	18,080	22,894	29,099	36,081
Tuolumne	54,863	58,721	64,161	67,510	70,325	73,291

Source: California Department of Finance 2007

Table 3-11. Labor Force and Unemployment in the Study Area, 2007

Industry Sector	Madera	Mariposa	Mono	Tuolumne	TOTAL
Civilian Labor Force	66,700	8,850	8,960	26,460	110,970
Civilian Employment	61,000	8,200	8,500	24,580	102,280
					Average Rate
Civilian Unemployment Rate	8.5%	7.3%	5.1%	7.1%	

Note: Data from December 2007 (benchmark 2006), not adjusted for seasonality.
Source: CEDD 2008

Table 3-12. Industry Employment in the Study Area, 2007

Industry Sector	Madera	Mariposa	Mono	Tuolumne	Total
Agriculture	10,500	10	40	70	10,620
Construction and mining	2,700	340	0	1,410	4,450
Manufacturing	3,300	120	60	920	4,400
Transportation, public utilities, trade	5,700	340	960	3,040	10,040
Information	500	0	0	270	770
Finance, insurance, real estate	800	0	470	660	1,930
Services	12,700	2,470	4,250	6,270	25,690
Government	11,100	2,000	1,520	5,630	20,250
Total	47,300	5,280	7,300	18,270	78,150

Note: Data from December 2007 (benchmark 2006), not adjusted for seasonality. Totals may include rounding errors.
Source: California Employment Development Department 2008 (http://www.labormarketinfo.edd.ca.gov/cgi/dataanalysis/)

Crane Flat Setting

Yosemite Institute currently employs 50 staff: 33 full- time instructors, 10 administrative staff, three facilities staff, and four food preparation workers. Two staff members (site managers) are regularly housed at the Crane Flat campus. The remaining 48 employees are housed in units owned by Yosemite Institute or in rented or privately owned housing in El Portal, Foresta, Midpines, or Yosemite West. The majority of Yosemite Institute's employees live in El Portal, where the Institute owns four residential properties used for employee housing. The Yosemite Institute also leases the El Portal Hotel from the National Park Service; the hotel has 12 beds. The *Yosemite Valley Plan* (NPS 2000b) called for the rehabilitation and possible adaptive reuse of the El Portal Hotel; however, if reuse is not feasible, it could be removed.

At the Crane Flat campus, housing options currently include two student dormitories (to accommodate up to 76 students), two staff trailers, and one temporary staff dormitory. The campus provides permanent housing for two staff persons in modular units; however, most of the YI staff reside in El Portal. Approximately 10 YI staff reside in Foresta, and there are an additional six temporary staff beds on campus, used during periods of inclement weather or due to programming requirements (i.e., evening programs).

The environmental education campus serves approximately 13,000 children, adults, teachers, and families each year, representing more than 450,000 person- hours of programming. Educational programs target students from kindergarten through 12th grade, serving more than 300 elementary schools in California. The Yosemite Institute also offers teacher training programs and adult educational opportunities. Yosemite Institute's current annual operating budget for 2008 is estimated to be approximately $3.69 million. Program revenues are generated from tuition and fundraising, and any surplus is used for scholarship programs, facility maintenance, or other such programs. Program costs go to transportation and concession spending, staff, and facility management. In 2008, the Yosemite Institute is expected to pay an estimated $1.57 million to the DNC (Yosemite Concession Services) for board, lodging, and transport. Of the $1.57 million, an estimated $155,000 would be paid to the Yosemite Transportation System for transportation services. Additional data concerning programming and operations associated with the environmental education campus is found in Chapter 2 (Alternatives).

As of 2008, tuition fees for the school and group programs range from $30 to $415 for youth participants, depending on the length of the program, and $30 to $325 for adults. The Yosemite Institute also hosts a Teen Summer Field Research Program and the Armstrong Scholars Program. Tuition is $1,750 for the summer research program and $1,150 for the scholars program. Participants in the Armstrong Scholars Program, however, pay $150, as $1,000 scholarships are available to each of the 12 selected participants each year. In 2006, the Yosemite Institute awarded $230,000 in scholarship money; in 2007, $300,000 was awarded, and the Yosemite Institute plans to award $250,000 in 2008.

Henness Ridge Setting

Henness Ridge is located near Yosemite West and Chinquapin, approximately 10 miles south of Crane Flat. There are no NPS campgrounds in the immediate area; however, there is a ranger station at Chinquapin, along with approximately 100 homes, condominiums, and cabins in the private community of Yosemite West. The ranger station at Chinquapin was constructed in 1934; the rest stop at Chinquapin also includes bathrooms and picnic tables.

Potential opportunities for employee housing for the Henness Ridge location would be concentrated in Yosemite West and Wawona. The ranger station and facilities at Chinquapin could also provide an opportunity for housing if the building is adaptively reused and rehabilitated. Onsite employee accommodations would be limited to food service staff (4), facility and maintenance staff (1), and a site manager.

Environmental Consequences

Intensity Level Definitions

Impacts to socioeconomic conditions were evaluated using the process described for all impact topics in this document. Impact threshold definitions for socioeconomics are as follows:

Negligible: Socioeconomics would not be affected, or impacts would not depart measurably from the baseline conditions.

Minor: Impacts to socioeconomics would be detectable, but would have a small increase or decrease (less than 25% increase or decrease) on population and/or employment. If mitigation is needed to offset adverse impacts, mitigation measures would be relatively easy to implement.

Moderate: Impacts to socioeconomics would be readily apparent and would result in a minor increase or decrease on population and/or employment (25%- 50% increase or decrease). Mitigation would probably be necessary to offset adverse impacts.

Major: Impacts to socioeconomics would be readily apparent and would substantially change the social and economic characteristics of a large area in Yosemite National Park, and the four-county study area. Extensive mitigation would probably be necessary to offset adverse impacts, and its success could not be guaranteed.

Impairment

Definition

Impairment is not applicable to this topic.

Impacts under Alternative 1 (No- Action Alternative)

Operation- related Impacts. Under the No- Action Alternative, the campus at Crane Flat would remain in its existing condition and although necessary maintenance and repairs would continue, no major undertakings are planned. In the short term, administration of the campus would not change, and operations and use would be similar to existing conditions. Because no new construction or major changes in the administration of the campus would occur under Alternative 1, operation of the environmental education campus, employment, local and regional spending, and the effect on local and regional housing would continue, similar to existing conditions. Therefore, in the short term, implementation of Alternative 1 would continue to have a minor, beneficial impact on the regional economy. The shortage of available local housing in the area would continue to result in negligible to minor, adverse impacts related to local housing.

In general, the socioeconomic characteristics (population and employment) of the environmental education campus, local communities, and region are not expected to change measurably by the implementation of Alternative 1. Despite potential adverse effects as a result of increased demand for housing, overall impacts to socioeconomics are expected to be beneficial (increased employment and population).

Impact Significance. Regional, long- term, negligible, beneficial impact.

Conclusion. Operations of the environmental education campus would remain similar to existing conditions, and employment, local and regional spending, and the effect on local and regional housing would continue similar to existing conditions. Under Alternative 1 there would be a regional, long- term, minor, beneficial impact to socioeconomics.

Impacts under Alternative 2 (Crane Flat Redevelopment)

Construction- related Impacts. Under Alternative 2, Yosemite Institute would redevelop the Crane Flat campus to include 14 new structures and two parking lots. The cost to implement Alternative 2 is estimated to be between $15 and $20 million. Construction and redevelopment activities at the new Crane Flat facility would employ approximately 25 to 75 construction workers as well as four construction- related management and administrative staff (compared with no construction spending or workers under Alternative 1). The construction work force is not expected to draw from the local work force and would most likely consist of workers from California's Central Valley. Construction is expected to last 18 months. Therefore, construction spending, and to a lesser degree employment, are expected to have a regional, short- term, minor, beneficial impact on the region's economy for the duration of construction.

The non- local construction work force would likely result in an increased demand for local, temporary housing. This increased demand would likely exacerbate the current housing shortage, and result in a short-term, minor, adverse impact.

Despite potential adverse effects as a result of increased demand for housing, overall impacts to socioeconomics are expected to be beneficial (increased employment and population).

Impact Significance. Regional, short- term, minor, beneficial impact.

Operation- related Impacts. Redevelopment of Crane Flat would accommodate 78 more students (154 total) than the current facilities (No- Action Alternative).There are no major administrative staffing changes expected for Alternative 2, compared with current conditions. The Yosemite Institute proposes a ratio of approximately 14 students per one instructor; therefore, the ability to accommodate an additional 78 students would result in additional five to six instructors at the Crane Flat campus. Housing at the redeveloped Crane Flat campus would accommodate 14 staff members, and the remaining staff would be housed in neighboring communities such as El Portal, West Yosemite, and Foresta. As with the No- Action Alternative, there are an additional six temporary staff beds on campus, used during periods of inclement weather or due to programming requirements (i.e., evening programs).

Under current conditions, two staff members are permanently housed at the existing campus; therefore, with such a minor increase in staff housing capabilities, there are no expected changes to demands on the regional and local housing supply; the effect on local and regional housing would continue, similar to existing conditions. As with Alternative 1, because no major changes in the administration of the campus would occur under Alternative 2, operation of the environmental education campus, employment, local and regional spending, and the effect on local and regional housing would continue, similar to existing conditions. Therefore, in the short term, implementation of Alternative 2 would continue to have a minor, beneficial impact on the regional economy.

In general, the socioeconomic characteristics of the environmental education campus, local communities, and region are not expected to change measurably by the implementation of Alternative 2. Despite potential adverse effects as a result of increased demand for housing, overall impacts to socioeconomics are expected to be beneficial (increased employment and/or population).

Impact Significance. Local, long- term, minor, beneficial impact.

Conclusion. The projected $12 to $14 million of local construction spending and up to 75 jobs associated with construction of the new facilities at Crane Flat would have a regional, short- term, minor, beneficial impact on the economy.

Impacts under Alternative 3 (Henness Ridge Center)

Construction- related Impacts. Under Alternative 3, a new campus location and program at Henness Ridge would be established and the Crane Flat campus would be closed. The cost estimate of implementing Alternative 3 would be between $15 and $20 million for construction of a new campus. Construction and development activities at the Henness Ridge facility would employ approximately 25 to 75 construction workers as well as four construction-related management and administrative staff. Construction is expected to last 18 months. The construction work force is expected to draw from the local and regional work force. Therefore, construction spending, and to a lesser degree employment, are expected to have a local and regional, short-term, minor, beneficial impact on the region's economy for the duration of construction.

Any regionall construction work force would likely result in an increased demand for local, temporary housing. This increased demand would likely exacerbate the current housing shortage, and result in a short-term, minor, adverse impact.

Despite potential adverse effects as a result of increased demand for housing, overall impacts to socioeconomics are expected to be beneficial (increased employment and population).

Impact Significance. Local and regional, short-term, minor, beneficial impact.

Operation-related Impacts. Construction of new facilities at Henness Ridge would accommodate 224 students comparied to 76 students at the current facilities (No-Action Alternative). There are no major administrative staffing changes expected for Alternative 3, compared with current conditions. As previously noted, the Yosemite Institute proposes a ratio of approximately 14 students per one instructor; therefore, the ability to accommodate the additional students would result in an additional 11 instructors. As with Alternatives 1 and 2, there are no major administrative changes proposed under Alternative 3; therefore, the demand for local housing would not increase. However, the demand for new housing could shift towards Yosemite West and Wawona from El Portal.

As with those under Alternative 2, the socioeconomic characteristics of the education campus, local communities, and region are not expected to change measurably as a result of the implementation of Alternative 3.

Impact Significance. Local, long-term, minor, beneficial impact.

Conclusion. The projected $15 to $20 million of local construction spending and up to 79 jobs associated with construction of the new facilities at Henness Ridge would have a regional, short-term, minor, beneficial impact on the region's economy.

CUMULATIVE IMPACTS

Council on Environmental Quality (CEQ) regulations (42 USC 4321 et seq.) require an assessment of the cumulative impacts of proposed federal actions in NEPA documents. Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7).

In this EIS, cumulative impacts are assessed for each alternative. Cumulative impacts were assessed by combining the impacts of each alternative with the impacts of other past, present, and reasonably foreseeable future actions. The geographic scope for this analysis includes Yosemite National Park and the immediate area and communities near the alternative sites. The following actions are considered reasonably foreseeable future, present, and past actions:

Past Actions

- Cascades Diversion Dam Removal
- Cook's Meadow Ecological Restoration
- Curry Village Employee Housing
- El Portal Road Improvement Project – Park Boundary to Big Oak Flat Road
- El Portal Road Improvements Project (Narrows to Pohono Bridge)
- Happy Isles Dam Removal
- Happy Isles Fen Habitat Restoration Project
- Happy Isles Gauging Station Bridge Removal
- Hodgdon Meadow Housing Area Trailer Replacement Project
- Invasive Plant Management Plan for Yosemite National Park
- Lower Yosemite Falls Project
- Mariposa County General Plan (Update)
- Merced River Ecological Restoration at Eagle Creek Project
- Tunnel View Overlook Rehabilitation
- Yosemite Valley Shuttle Bus Procurement

Present Actions

- Aquatic Management Plan
- Communication Data Network
- Comprehensive Transportation Plan
- Crane Flat Utilities
- Curry Village Tent and Cabin Relocation
- Glacier Point Road Rehabilitation
- Hetch Hetchy Communication System Upgrade Project
- Indian Cultural Center
- Rehabilitation of the Yosemite Valley Loop Road
- Scenic Vista Management Plan
- Tuolumne Meadows Concept Plan
- Utilities Master Plan/East Yosemite Valley Utilities Improvement Plan

Reasonably Foreseeable Future Actions

- El Capitan Meadow Restoration Project
- El Portal Concept Plan
- New Merced Wild and Scenic River Comprehensive Management Plan
- Resurface 24.5 Miles of Wawona Road
- Tuolumne Wild and Scenic River Comprehensive Management Plan

- Visitor Use and Floodplain Restoration in East Yosemite Valley
- Wawona Road Maintenance Facility
- Wilderness Management Plan
- Yosemite Museum Master Plan
- Yosemite Valley Loop Trail to West Yosemite Valley
- Yosemite Valley Shuttle Bus Stop Improvements

Of these, the following were particularly relevant and formed the basis of the cumulative impact analysis:

El Capitan Meadow Restoration Project. The 60- acre El Capitan Meadow is located in west Yosemite Valley between El Capitan and the Merced Wild and Scenic River. A popular destination for many park visitors, El Capitan Meadow affords people an opportunity to enjoy magnificent views of Cathedral Spires and El Capitan, as well as take part in other recreational activities. El Capitan is also a world- renowned "big wall" that attracts rock climbers from all over with hopes of completing one of its many routes to the top. This often attracts people to the meadow where they wander the area and gaze, with necks craned, searching the massive rockface for climbers making the 3,589- foot ascent.

Vegetation and soils in the meadow are becoming increasingly degraded due to trampling from visitor foot-traffic and inappropriate vehicle parking. A significant impact to the meadow was the removal of a portion of the El Capitan Moraine in 1879, which lowered the water level 4 to 6 feet in the area. Although this was beneficial to early settlers because it allowed for more useable dry land, it greatly reduced the amount of water available to the meadow. Other historic actions such as tilling, ditching, culverts, and road building have also contributed to meadow deterioration.

The major goals of the proposed project are the following:

- Restore meadow vegetation and natural processes
- Minimize social trails
- Develop ecologically appropriate visitor access
- Improve visitor experience
- Protect sensitive meadow areas

Resurface 24.5 Miles of Wawona Road. This project will rehabilitate 24.5 miles of pavement on Wawona Road between the South Entrance Kiosk Area and Southside Drive in Yosemite Valley. Delays will be up to 15 minutes during commuter hours, up to 30 minutes during the day, and up to 60 minutes during the night. The project is scheduled to begin in March or April of 2010 with completion in November of 2011.

Visitor Use and Floodplain Restoration in East Yosemite Valley Project. The ecological restoration program seeks to restore natural processes to ecosystems so that portions of Yosemite Valley can recover from past human development and activities. A plan is being developed for the ecological restoration of the Upper River, Lower River, North Pines, and the northwest end of Lower Pines campgrounds; Group Camp, Backpackers Camp; Housekeeping Camp within the River Protection Overlay of the Merced River; and The Ahwahnee tennis court in Yosemite Valley. As part of this project, surveys are being conducted for archeological sites; the history of human disturbance in the area is being investigated; the former distribution of meadow, wetland, and forest communities is being investigated; a restoration prescription is being developed that recognizes the retention, modification, or removal of bridges, bicycle paths, riprap, and roads;

the necessity and extent of revegetation is being determined; a revegetation strategy is being developed; and monitoring of river channel morphology is being conducted.

Ecological restoration may include the following:

- Removal of imported fill material
- Removal of abandoned roads and infrastructure
- Re- establishment of natural contours on the land
- Restoration of natural surface and groundwater movement
- Replanting of native vegetation
- Removal of non- native plant and animal species
- Restoration of carbon and nitrogen cycles in degraded soils

Yosemite Valley Shuttle Bus Stop Improvements. This project consists of the preparation of preliminary design plans, environmental compliance documents, and construction drawings; the construction of six 10-foot by 80- foot concrete braking pads; and the rehabilitation or replacement of 94,000 square feet of asphalt road approaches in Yosemite Valley. Construction has begun on this project.

Communication Data Network. This project proposes to upgrade Yosemite's internal communications system with more reliable, efficient technology and create a communications backbone that can support all the park's communication needs. The new network will employ modern technology to provide a uniform platform for computer LAN data, radio communications, security and safety video systems, telephony, burglar/intrusion and fire alarm systems, traffic collection data, and telemetry.

The communication network includes several existing communication sites in the park (such as at Henness Ridge), as well as a few new sites at: Rockefeller Grove Road repeater (at Big Oak Flat near Crane Flat), Hodgdon Meadow Maintenance Complex, Hetch Hetchy Entrance Station, May Lake Junction, and Wawona maintenance yard. An EA has been prepared and released for public review in January 2010.

Comprehensive Transportation Plan. This plan will study modern transportation solutions for the park. Many past park plans have studied transportation, both parkwide and in specific areas such as Yosemite Valley. However, many areas such as the Wawona and Tioga Road corridors have not been re- examined since the NPS *General Management Plan* (1980). Previous plans defined problems and solutions to deal with visitation and demographic projections that reflected trends characteristic of that time period. Since then, the park has continued to update transportation and visitor information through a grant from the Federal Transit Administration. These new data indicate that many previous predictions and assumptions are not consistent with today's conditions, and thus a fresh examination of transportation systems and solutions is warranted. Park planners, social and natural scientists, and transportation managers will work together to prepare a new plan. They will compile past plans and decisions regarding visitor experience, access, and resource conditions relative to our transportation system, examine how the system is currently functioning, and, with public input, identify issues, develop alternatives, and present solutions in a comprehensive transportation management plan.

Curry Village Tent and Cabin Relocation. Following the October 2008 rockfall in Yosemite Valley, the NPS has had to permanently close 234 visitor tents and cabins and 92 employee bedspaces within the rockfall zone at Curry Village. This has resulted in the loss of 350 overnight accommodations formerly used by YI students during the winter season (and seasonal park employees during the summer months). In an emergency action (as noted in the recent Merced River Plan Settlement Agreement), NPS replaced the lost housing in spring

2009 by adding new cabins to the Boystown employee housing area adjacent to Curry Village. This solution provides accommodations for approximately 237 YI students; 113 fewer beds than pre- rockfall. The displaced students, under both action alternatives, would be housed at a new larger campus outside the valley. Under the action alternatives, approximately 74 students formerly lodged in the Valley would be housed outside of the Valley, at either the new Henness Ridge campus under Alternative 3, or under Alternative 2, at Crane Flat.

Glacier Point Road Rehabilitation. Rehabilitation of the Glacier Point roadway will repair and resurface existing roadway pavement and drainage facilities. Pavement rehabilitation will involve some sort of in- place recycling of the existing deteriorated pavement, followed by the placement of new asphalt paving. All drainage culverts will be examined for condition, capacity, and proper location. Culverts found to be in poor condition, undersized, and/or poorly located will be replaced in improved locations with properly sized pipes. As necessary, the drainage channels to and downstream of existing culverts will be examined for potential improvements. Existing stone masonry at culvert headwalls and outlets will be salvaged and reused. The proposed pavement rehabilitation work can be accomplished within the existing disturbed road corridor. However, culvert relocation or rehabilitation and the improvement of drainage channels to existing culverts will require disturbance of some new areas.

This project is underway.

Rehabilitation of the Yosemite Valley Loop Road. The Yosemite Valley Loop Road is a historic feature in Yosemite National Park, first built as a stagecoach road in 1872. The initial pavement was laid in 1909, and culverts were first installed a year later beneath stretches of Southside Drive. Spot repairs have been made along the roadway as required over time. However, much- needed comprehensive maintenance and repair of the roadway and associated drainage structures has not been performed for many decades. Since 1980, annual visitation to Yosemite National Park has averaged 3.4 million people, 95% of which is focused in Yosemite Valley. Dramatic scenery, the Merced Wild and Scenic River, and diverse recreational opportunities draw visitors to the Valley year- round, making it one of the most heavily developed areas of the park. As a result, the Yosemite Valley Loop Road experiences the heaviest traffic volumes of any area in Yosemite National Park. Automobiles make up the majority of the volume, but tour buses and public transportation vehicles also contribute to Yosemite Valley traffic. Bus transportation in Yosemite National Park includes regional public transportation, charter and tour bus operators, concessionaire- operated tours, and shuttle bus services provided by the park concessionaire. With the exception of shuttle bus services in Tuolumne Meadows and between the Mariposa Grove and Wawona, nearly all park buses travel to, from, and within Yosemite Valley.

The purpose of this project is to repair and resurface existing roadway pavement, rehabilitate or replace adjacent drainage features (e.g., culverts, diversion ditches, and headwalls), and improve the condition of adjacent roadside parking along approximately 12.5 miles of the Yosemite Valley Loop Road in Yosemite Valley. No roadway widening (outside of the original road prism width of 22 feet), realignment, or changes to vehicular or pedestrian circulation patterns as called for in the NPS *Final Yosemite Valley Plan Supplemental Environmental Impact Statement* (2000b) will be undertaken.

The need for this project is evidenced by the fact that the existing road surface and associated drainage features are in poor condition because major maintenance repairs have not been undertaken for many years. Numerous existing culverts are undersized, in disrepair, and/or ineffectively located to capture peak seasonal runoff. In addition, informal roadside parking along stretches of the Yosemite Valley Loop Road presents visitor safety and resource impact concerns.

Scenic Vista Management Plan. This plan will guide management actions by the NPS to protect Yosemite's historic viewsheds and the natural processes that created them, preserve the historic and cultural contexts in which the viewpoints were created, and restore visitor use opportunities associated with lost vistas. In cases where historic viewpoints cannot be rehabilitated, the NPS may identify potentially new views or vistas to develop and/or protect which could sustainably provide a comparable experience. Vistas may be restored and maintained, whenever practicable, by restoring species composition, structure and function to systems, or by using traditional American Indian vegetation management practices. Preparation of the Environmental Assessment is currently underway with public review scheduled for 2010.

Tuolumne Meadows Concept Plan. The Tuolumne Meadows, at an elevation of 8,600 feet above msl, is the Sierra's largest subalpine meadow. Current facilities in the Tuolumne Meadows area include a 304- site campground, a visitor center, a service station, a 104- bed lodge, food services, government and concession stable operations, employee housing, a wastewater treatment plant, and several administrative buildings. These facilities support approximately 5,000 park visitors and 200 park staff daily from May through October. Although improvement or relocation has been considered for many of these facilities, there is no comprehensive plan that looks at the entire Tuolumne Meadows area as a whole and determines the desired extent and location of development. A Concept Plan will define management objectives, including resource protection goals for the entire area, and it will identify boundaries for specific types of development. This will allow implementation of management objectives and appropriate facility construction as incremental funding becomes available.

The environmental compliance process for the Tuolumne Meadows Concept Plan is currently in progress.

Cook's Meadow Ecological Restoration. This project is restoring a dynamic and diverse wetland ecosystem. The Cook's Meadow restoration project involves the following actions:

- Filling four drainage ditches created by early Euro- American settlers
- Removing a raised, abandoned roadbed and a trail that bisected the meadow
- Reconstructing the trail on an elevated boardwalk that now allows water to flow freely and reduces foot traffic on sensitive meadow plants
- Installing culverts under Sentinel Road to direct runoff into the meadow and restore the natural flow of water from the Merced River during seasonal periods of high water
- Reducing non- native plant species encroaching on native species by using manual, mechanical, and chemical control methods

This project was completed at the end of 2005, and ongoing monitoring will continue.

Curry Village Employee Housing. This project includes the design and construction of new employee housing and related facilities to accommodate approximately 217 concessionaire employees in the area west of Curry Village in Yosemite Valley. This housing will replace concessionaire housing lost in the January 1997 flood. The employee housing units have been designed in accordance with the character of the area, with particular focus on the Curry Village Historic District. The scope of this housing project includes providing parking and access, an employee wellness center, concessionaire housing, management offices, maintenance facilities, postal facilities, and housing related storage.

The compliance for this project was completed in 2004, and construction was completed in 2007.

Happy Isles Fen Habitat Restoration Project. The Happy Isles Fen is a 2- acre wetland immediately west of the Nature Center at Happy Isles in east Yosemite Valley. In 1928, the National Park Service filled in about 3 additional acres of the fen to create a parking lot. The asphalt parking lot was removed in 1970, though imported fill remained. The area afffected by parking lot construction was restored to wetland conditions by removing imported fill and associated upland vegetation and revegetating with native wetland plants.

This project was completed in the fall of 2003.

Hodgdon Meadow Housing Area Trailer Replacement Project. The project is to construct a duplex in the Hodgdon Meadow Housing Area. This project will replace two obsolete trailers that were previously removed from the housing area. The new duplex, which will house up to eight park employees or two park employees and their families, will be located on a previously affected site formerly occupied by one of the two trailers. This project is part of an agency- wide effort to replace trailers and other substandard housing with new cost-effective, energy- efficient structures. Upgrades to the well water disinfection system will accompany the duplex construction.

This project is underway.

Mariposa County General Plan (Update). The Mariposa County General Plan updated the countywide zoning ordinances and related implementing documents. The update allowed Mariposa County to comply with current California law and changes to state law since the 1980 General Plan was adopted. This update followed established public involvement protocol and responded to countywide land- use issues. The Mariposa County General Plan update was completed in 2005.

Geology, Geologic Hazards, and Soils

Alternative 1. Cumulative effects on soils would be negligible because under this alternative local, minor adverse impacts on soils would not add appreciably to soils impacts of related actions in other locations.

Alternative 2. Related actions, such as construction or demolition of campgrounds, lodging, employee housing, and other facilities, could result in degradation of geology and soils. However, restoration projects, e.g., Cook's Meadow Ecological Restoration and Merced River Ecological Restoration at Eagle Creek, would have long- term beneficial effects on soils.

Redevelopment of the campus would disturb very few areas that have not already been affected by construction of the original Blister Rust Camp and the existing campus. Applying conventional BMPs would reduce the potential for contributing to regional soil loss. Negligible cumulative adverse impacts to soils and geology are expected to occur under this alternative because under this alternative local minor impacts would not add appreciably to impacts from related actions in other locations.

Alternative 3. Related actions, such as construction or demolition of campgrounds, lodging, employee housing, and other facilities, could result in degradation of geology and soils. However, restoration projects, e.g., Cook's Meadow Ecological Restoration and Merced River Ecological Restoration at Eagle Creek, would have long- term beneficial effects on soils.

Development of the new campus would disturb some areas that have not already been affected by previous construction or road building. Applying conventional BMPs would reduce the potential for contributing to regional soil loss. Negligible cumulative adverse impacts to soils and geology are expected to occur under this alternative because under this alternative local minor impacts would not add appreciably to impacts from related actions in other locations.

Hydrology

Alternative 1. Cumulative effects on hydrology would be minor because the campus and existing facilities' localized impacts on water levels are confined to Crane Flat Meadow during low- water periods. Excess groundwater pumping to supply water to all the Crane Flat facilities could exacerbate the groundwater level decline caused by current groundwater pumping.

Alternative 2. The cumulative effects on hydrology would be moderate under this alternative. Localized impacts on water levels within Crane Flat Meadows during excess pumping periods and dry water periods would exacerbate the groundwater level decline caused by current groundwater pumping.

Alternative 3. The cumulative effects on hydrology would be long- term, minor, and adverse at the Henness Ridge Site. The construction of the buildings and a parking lot within the complex would alter surface hydrology by the removal of vegetation and replacement with impervious surface. In addition, soils compaction and vegetation loss could be the result of impacts associated with the increased concentration of visitors, thereby increasing stormwater runoff from the complex. As a result, there would be a local, long-term, minor, cumulative adverse impact on hydrology.

Restoration at Crane Flat under Alternative 3 would result in a minor beneficial cumulative impact to hydrology when combined with other restorative projects that improve functioning of the natural hydrologic cycle.

Water Quality

Alternative 1. Cumulative effects on water quality would be negligible because under this alternative the localized, minor, adverse impacts on water quality would not add to water quality impacts of related actions in other locations.

Alternative 2. Related actions, such as construction or demolition of campgrounds, lodging, employee housing, and other facilities, could result in degradation of water quality. However, restoration efforts would have long- term beneficial cumulative effects on both surface and groundwater quality.

Redevelopment of the campus under Alternative 2 would disturb only a relatively small area that has not already been affected by previous construction or the existing campus. Application of BMPs during construction and the relatively small increases of impervious areas and wastewater generation would limit the potential for impacts to water quality. Negligible cumulative impacts to surface and groundwater quality are expected to occur under this alternative because under this alternative, the localized minor impacts would not add to impacts from related actions in other locations.

Alternative 3. As discussed previously, related actions, such as construction or demolition of campgrounds, lodging, employee housing, and other facilities, could result in degradation of water quality. However, restoration efforts would have long- term beneficial cumulative effects on both surface and groundwater quality.

Applying BMPs during the construction phase would reduce the potential for contributing to regional impacts on water quality. Negligible cumulative impacts to surface and groundwater quality are expected to occur from construction of the Henness Ridge campus and associated utility line, roadways, and paths because the localized minor impacts under this alternative would not add to impacts from related actions in other locations.

Restoration at Crane Flat under Alternative 3 would result in a minor beneficial cumulative impact to water quality when combined with other restorative projects that reduce soil erosion and improve functioning of the natural hydrologic cycle.

Wetlands

Alternative 1. Cumulative effects to wetland resources would be negligible because continued localized minor impacts would not affect wetlands in other locations throughout the park. In addition, the protection and enhancement of other wetland resources throughout the park under past, present, and reasonably foreseeable actions that would increase the size, connectivity, and integrity of wetland resources within the Yosemite National Park region would result in a long- term, major, beneficial, cumulative effect on wetland resources in Yosemite National Park. There would be no contribution to this effect under Alternative 1.

Alternative 2. Cumulative effects to wetland resources would be negligible because continued localized minor impacts would not affect wetlands in other locations throughout the park. In addition, the protection and enhancement of other wetland resources throughout the park under past, present, and reasonably foreseeable actions that would increase the size, connectivity, and integrity of wetland resources within the Yosemite National Park region would result in a long- term, major, beneficial, cumulative effect on wetland resources in Yosemite National Park. There would be no contribution to this effect under Alternative 2.

Alternative 3. Cumulative effects to wetland resources would be negligible because minor continued localized impacts to nearby wetlands would not affect wetlands throughout the park. In addition, the protection and enhancement of other wetland resources throughout the park under past, present, and reasonably foreseeable actions that would increase the size, connectivity, and integrity of wetland resources within the Yosemite National Park region would result in a long- term, major, beneficial, cumulative effect on wetland resources in Yosemite National Park. There would be no contribution to this effect under Alternative 3.

Restoration at Crane Flat under Alternative 3 would result in a minor beneficial cumulative impact to wetlands when combined with other restorative projects that improve functioning of the natural hydrologic cycle and enhance and preserve wetland environments.

Vegetation

Alternative 1. Although vegetation is a key resource within the development vicinity, effects under this alternative on vegetation would be local. The extent and quality of vegetation throughout the development vicinity would remain unaffected. Cumulative effects on vegetation from past, present, and reasonably foreseeable future actions in the Yosemite National Park region, in combination with potential effects under this alternative, could result in a net long- term, major, beneficial effect on vegetation within Yosemite National Park.

Alternative 2. The cumulative impact analysis for vegetation under Alternative 2 is the same as described under Alternative 1. See the discussion of cumulative effects under Alternative 1.

Overall, related actions within the vicinity, especially habitat restoration actions, would increase the size, connectivity, and integrity of vegetation within the park, resulting in a long- term, major, beneficial cumulative effect on vegetation.

Alternative 3. The cumulative impact analysis for vegetation under Alternative 3 is the same as that described under Alternative 1. See the discussion of cumulative effects under Alternative 1.

Overall, related actions within the vicinity, especially habitat restoration actions, would increase the size, connectivity, and integrity of vegetation within the park, resulting in a long- term, major, beneficial cumulative effect on vegetation.

Restoration at Crane Flat under Alternative 3 would result in a minor beneficial cumulative impact to vegetaton when combined with other restorative projects that revegetate denuded areas.

Wildlife

Alternative 1. Cumulative effects on wildlife would be negligible because the localized minor impacts on vegetation and wildlife would not add to impacts of related actions in other locations.

Alternative 2. Related actions, such as construction or demolition of campgrounds, road and parking improvements, trail building, lodging, employee housing, and other facilities, would result in effects to wildlife and loss of wildlife habitat. However, restoration efforts in the area (e.g., Cook's Meadow Ecological Restoration and the Parkwide Invasive Plant Management Plan) would have long- term beneficial effects on vegetation communities and wildlife habitat and populations.

Redevelopment of the campus would disturb very few areas that have not already been affected by construction of the original Blister Rust Camp and the existing campus. Minor cumulative impacts to wildlife are expected to occur under this alternative because the localized minor impacts would not add to impacts from related actions in other locations.

Alternative 3. Minor cumulative impacts to wildlife are expected to occur from building and water reservoir excavation, utility line installation, and road and path construction in the area. In addition, pedestrian use of the campus environment would contribute to impacts on wildlife. However, restoration efforts in the area (e.g., the El Capitan Meadow Restoration Project and the Parkwide Invasive Plant Management Plan) would have long- term beneficial effects on wildlife.

Development of the campus would disturb very few areas that have not already been affected by construction of the original Blister Rust Camp and the existing campus. Minor cumulative impacts to wildlife are expected to occur under this alternative because the localized minor impacts would not add to impacts from related actions in other locations.

Restoration at Crane Flat under Alternative 3 would result in a minor beneficial cumulative impact to wildlife when combined with other projects that enhance wildlife habitat.

Rare, Threatened, and Endangered Species

Alternative 1. Cumulative effects on rare, threatened, and endangered species would be negligible because the localized minor impacts would not exceed existing ongoing levels and thus would not contribute to the effects of related actions in other locations.

Alternative 2. The overall cumulative effect under Alternative 2 on rare, threatened, and endangered species would be considered minor because of the amount of habitat disturbance and assuming implementation of mitigation measures to avoid or minimize direct and indirect effects as described above.

Alternative 3. The overall cumulative effect under Alternative 3 on rare, threatened, and endangered species would be considered minor because of the amount of habitat disturbance and assuming implementation of mitigation measures to avoid or minimize direct and indirect affects as described above.

Restoration at Crane Flat under Alternative 3 would result in a minor beneficial cumulative impact to rare, threatened, and endangered species when combined with other projects that restore, enhance, or preserve listed species' habitat.

Scenic Resources

Alternative 1. Under the No- Action Alternative, there would be no surface disturbance impacts, construction, or visually intrusive contrasts introduced into the existing landscape. Therefore, the cumulative impacts would be negligible because the impacts under this alternative would not contribute to impacts from other actions in other locations in the Park.

Alternative 2. Redevelopment of the campus would have localized impacts on scenic quality within the park. There would be negligible cumulative impacts to scenic quality because proposed activities under this alternative would not contribute to impacts from past, present, or future actions in other locations.

Alternative 3. The cumulative effects would be the same as discussed under Alternative 2 because the impacts to scenic resources would also be localized under this alternative.

Restoration at Crane Flat under Alternative 3 would result in a negligible beneficial cumulative impact to scenic resources when combined with other restorative projects that screen park development or otherwise improve park scenery.

Air Quality

Alternative 1. Cumulative effects on air quality are based on analysis of past, present, and reasonably foreseeable future actions in the Yosemite National Park region, in combination with potential effects under this alternative.

Since 1950, the population of California has tripled, and the rate of increase in vehicle miles traveled has increased six- fold. Air quality conditions within the park have been influenced by this surge in population growth and associated emissions from industrial, commercial, and vehicular sources in upwind areas. Since the 1970s, emissions sources operating within the park, as well as California as a whole, have been subject to local stationary- source controls and state and federal mobile- source controls. With the passage of time, such controls have been applied to an increasing number of sources, and the associated requirements have become dramatically more stringent and complex. In the 1980s, a Restricted Access Plan was developed for use when traffic and parking conditions in Yosemite Valley are overcongested. The plan has the effect of reducing the number of incoming vehicles and their related emissions until the traffic volume and parking demand in Yosemite Valley decrease sufficiently (as visitors leave the Valley) to stabilize traffic conditions. Implementation of the Yosemite Area Regional Transportation System and the Yosemite Valley Shuttle Bus Improvements also has the effect of reducing regional vehicle trips and associated air emissions.

Short- term adverse impacts on air quality could result from many of the reasonably foreseeable actions planned or approved within the park, such as the El Portal Road Reconstruction Project – Cascades Diversion Dam to Pohono Bridge, Curry Village Employee Housing, Lower Yosemite Fall, and the Yosemite Lodge Area Redevelopment projects. The adverse effects of these actions would be localized and short- term in nature, and primarily related to construction- generated traffic on roadways serving the development site. The intensity of the adverse effects from construction- related emissions would be negligible to minor, depending on the intensity of truck trips generated along park roads from simultaneously occurring construction actions.

Although cumulative growth in the region would tend to adversely affect air quality, implementation of ongoing state and federal mobile- source control programs would ameliorate this effect to some degree. With respect to particulate matter, conditions at Crane Flat would be determined by both regional sources and local sources and could be beneficial or adverse, because the level of particulate matter resulting from regional sources changes frequently. Considered together with the adverse impacts associated with regional air quality influences, the cumulative actions would have a local, long- term, minor, beneficial effect on air quality at Crane Flat.

Alternative 2. The cumulative impacts to local and regional air quality under Alternative 2 would be the same as those described under Alternative 1. See the discussion of cumulative effects under Alternative 1.

Alternative 3. The cumulative impacts to local and regional air quality under Alternative 3 would be the same as those described under Alternative 1. See the discussion of cumulative effects under Alternative 1.

Restoration at Crane Flat under Alternative 3, which includes the cessation of wood- burning, would result in a negligible beneficial cumulative impact to air quality when combined with other projects that reduce impacts.

Soundscape

Alternative 1. Cumulative effects to the ambient noise environment are based on the analysis of past, present, and reasonably foreseeable future actions in the Yosemite National Park region, in combination with potential effects under this alternative. The actions identified below are examples of actions that could affect noise in combination with the alternatives.

Short- term adverse impacts on ambient noise levels could result from construction activities associated with some of the reasonably foreseeable actions planned or approved within the park, such as the Curry Village Employee Housing, Lower Yosemite Fall, and the Yosemite Lodge Area Redevelopment actions. The adverse effects from construction of these developments would be localized and short- term in nature, and primarily related to construction- generated traffic on roadways serving the development sites in Yosemite Valley. Noise generated by the construction of cumulative actions would result in a local, short- term, negligible to minor, adverse impact to the ambient noise environment along park roads.

Over the long term, the gradual increase in annual visitation to the park could potentially offset the beneficial effects of the cumulative actions discussed above, resulting in a net local, long- term, minor, adverse effect on the noise environment. Implementation of Alternative 1 would not increase noise levels or generate any new sources of noise related to construction or operation of the facility and would not contribute to this cumulative impact.

Alternative 2. The cumulative impact analysis for noise under Alternative 2 is the same as described under the No- Action Alternative. See the discussion of cumulative impacts under Alternative 1.

The cumulative actions would result in a local, long- term, minor, adverse effect on the noise environment. Implementation of Alternative 2 would result in a local, long- term, negligible to moderate, adverse impact on the noise environment and would contribute to this cumulative effect. Overall, the impacts under Alternative 2 when combined with other actions would result in a local, long- term, minor, adverse cumulative effect on the noise environment.

Alternative 3. The cumulative impact analysis for noise under Alternative 3 is the same as described under the No- Action Alternative. See the discussion of cumulative impacts under Alternative 1.

The cumulative actions would result in a local, long- term, minor, adverse effect on the noise environment. Implementation of Alternative 3 would result in a local, long- term, negligible to minor, adverse impact on the noise environment. Overall, Alternative 3 and the cumulative actions would result in a local, long- term, minor, adverse effect on the noise environment.

Restoration at Crane Flat under Alternative 3 would result in a negligible, beneficial cumulative impact to soundscape when combined with other projects that reduce impacts.

Energy

Alternative 1. Cumulative effects to energy resources are based on the analysis of past, present, and reasonably foreseeable future actions in Yosemite National Park, in combination with potential effects under this alternative. The actions identified below are examples of actions that influence energy consumption and resources in Yosemite National Park.

Short- term adverse impacts on energy consumption could result from construction activities associated with some of the reasonably foreseeable actions planned or approved within the park, such as the Curry Village Employee Housing, Lower Yosemite Fall, and the Yosemite Lodge Area Redevelopment. The adverse effects from construction of these developments would primarily be related to the consumption of fuel and construction materials. However, the adverse effects from construction of these developments would be localized and short- term in nature; they would occur for the duration of the construction period and therefore would not be an ongoing drain. Energy consumed by the construction of cumulative actions would result in a local, short- term, minor, adverse impact to energy.

Over the long term, the gradual increase in annual visitation to the park could potentially increase energy use required to maintain park facilities and programs. This could potentially result in a parkwide, long- term, minor, adverse cumulative impact on energy resources. However, using renewable resources and energy- efficient designs for any new construction effort and transportation infrastructure in the park could offset this adverse effect by providing low- maintenance and low- energy use facilities. Under the No- Action Alternative, the campus would contribute to this cumulative impact in the long term.

Alternative 2. The cumulative impact analysis for energy under Alternative 2 is the same as described under the No- Action Alternative. See the discussion of cumulative impacts under Alternative 1.

The cumulative actions would result in a parkwide, long- term, minor, adverse effect on energy resources. The local, long- term, minor, beneficial impact under Alternative 2 would partially offset this cumulative effect; however, overall, implementation of Alternative 2 and the cumulative developments would result in a parkwide, long- term, minor, adverse effect on energy consumption.

Alternative 3. The cumulative impact analysis for energy under Alternative 3 is the same as described under the No- Action Alternative. See the discussion of cumulative impacts under Alternative 1.

The cumulative actions would result in a parkwide, long- term, minor, adverse effect on energy resources. The local, long- term, minor, beneficial impact under Alternative 3 would partially offset this cumulative effect; however, overall, implementation of Alternative 3 and the cumulative developments would result in a parkwide, long- term, minor, adverse effect on energy consumption.

Restoration at Crane Flat under Alternative 3 would result in a negligible beneficial cumulative impact to energy when combined with other projects that reduce impacts and use modern energy- efficient design and materials.

Wilderness

Alternative 1. Cumulative effects on wilderness would be negligible because the localized minor impacts would not add to wilderness impacts of related actions in other locations.

Alternative 2. Cumulative effects on wilderness would be negligible because the localized minor impacts would not add to wilderness impacts of related actions in other locations.

Alternative 3. Cumulative effects on wilderness would be negligible because the localized minor impacts would not add to wilderness impacts of related actions in other locations. Restoration at Crane Flat under Alternative 3 would not appreciably contribute to cumulative impacts on wilderness.

Archeology

Alternative 1. Cumulative impacts to archeological resources are based on analysis of past, present, and reasonably foreseeable future actions in Yosemite National Park Valley, in combination with potential effects under this alternative. In general, the archeological resources of the park are the result of thousands of years of human occupation. Archeological resources have been affected by past actions in the park since its inception. During all future actions, measures would be taken to avoid or minimize effects in accordance with the 1999 PA.

Although continued operation of the existing environmental education campus would result in no effect to historic properties, reasonably foreseeable future actions proposed in the region could affect archeological resources that may qualify as historic properties. Several archeological sites could be disturbed or lost, resulting in adverse effects to archeological resources. Specific impacts, and the determination of effect, would depend upon the nature, location, and design of ground- disturbing actions, as well as the quantity and data potential of the archeological resource(s) affected. Historic properties would be evaluated pursuant to the 1999 PA.

Alternative 2. The cumulative impact analysis for Archeology under Alternative 2 is the same as described under Alternative 1.

Although redevelopment of the Crane Flat campus would have no effect on historic properties, reasonably foreseeable future actions proposed in the region could affect archeological resources that may qualify as historic properties. Several archeological sites could be disturbed or lost, resulting in adverse effects to archeological resources. Specific impacts, and the determination of effect, would depend upon the nature, location, and design of ground- disturbing actions, as well as the quantity and data potential of the archeological resource(s) affected. Historic properties would be evaluated pursuant to the 1999 PA.

Alternative 3. The cumulative impact analysis for Archeology under Alternative 3 is the same as described under Alternative 1.

Although restoration of the Crane Flat campus would have no effect on historic properties and development of the new Henness Ridge campus would have no adverse effect on historic properties, reasonably foreseeable future actions proposed in the region could affect archeological resources that may qualify as historic properties. Several archeological sites could be disturbed or lost, resulting in adverse effects to archeological resources. Specific impacts, and the determination of effect, would depend upon the nature, location, and design of ground- disturbing actions, as well as the quantity and data potential of the archeological resource(s) affected. Historic properties would be evaluated pursuant to the 1999 PA.

American Indian Traditional Cultural Properties

Alternative 1. Cumulative impacts to American Indian TCPs and practices reflect the analysis of past, present, and reasonably foreseeable future actions in Yosemite National Park, in combination with potential effects under this alternative. American Indian TCPs and their traditional cultural associations have been lost or damaged in the Crane Flat area through past development, visitor use, natural events, and widespread disruption of cultural traditions. Nevertheless, Yosemite National Park retains many sites and resources of significance to local and culturally associated American Indians.

Although continued operation of the existing environmental education campus would result in no effect to TCPs, reasonably foreseeable future actions proposed in the region that could affect American Indian TCPs would be performed in accordance with stipulations in the park's 1999 PA and with ongoing consultation between the National Park Service and American Indians with traditional cultural ties to the area. With continuing consultation regarding measures to avoid or minimize effects to traditional uses and significant areas, there would be no adverse effect to TCPs. Specific impacts would depend upon the nature, location, and design of the facility to be developed or removed, as well as the quantity and data potential of the American Indian traditional uses affected.

Alternative 2. The cumulative impact analysis for TCPs under Alternative 2 is the same as described under Alternative 1.

Although redevelopment of the Crane Flat campus would have no adverse effect to resources managed as TCPs, reasonably foreseeable future actions proposed in the region that could affect American Indian TCPs would be performed in accordance with stipulations in the park's 1999 PA and with ongoing consultation between the National Park Service and American Indians with traditional cultural ties to the area. With continuing consultation regarding measures to avoid or minimize effects to traditional uses and significant areas, there would be no adverse effect to TCPs. Specific impacts would depend upon the nature, location, and design of the facility to be developed or removed, as well as the quantity and data potential of the American Indian traditional uses affected.

Alternative 3. The cumulative impact analysis for TCPs under Alternative 3 is the same as described under Alternative 1.

Although restoration of the Crane Flat campus would have no adverse effect to resources managed as TCPs, and development of the new Henness Ridge campus would have no effect on TCPs, reasonably foreseeable future actions proposed in the region that could affect American Indian TCPs would be performed in accordance with stipulations in the park's 1999 PA and with ongoing consultation between the National Park Service and American Indians with traditional cultural ties to the area. With continuing consultation regarding measures to avoid or minimize effects to traditional uses and significant areas, there would be no adverse effect on TCPs. Specific impacts would depend upon the nature, location, and design of the facility to be developed or removed, as well as the quantity and data potential of the American Indian traditional uses affected.

Historic Structures, Buildings, and Cultural Landscapes

Alternative 1. Cumulative impacts to historic structures, buildings, and cultural landscape resources reflect the analysis of past, present, and reasonably foreseeable future actions in the Crane Flat area, in combination with potential effects of this alternative. Cultural landscape resources have been lost or damaged through past development, visitor use, and natural events. In wilderness areas, cultural landscape resources include remnants of early stock grazing, trails, and work camps. In the Crane Flat complex, cultural landscape resources include the ranger station, a generator shed, storage building, four- stall garage, light plant, and the Blister Rust Camp structures. Structures and sites in other areas include homestead cabins, barns, road and trail segments, bridges, mining complexes, railroad and logging facilities, blazes, and campsites. These resources are reminders of the area's ranching, grazing, lumbering, and mining history.

Although continued operation of the existing environmental education campus would result in no adverse effect to historic buildings considered historic properties, reasonably foreseeable future actions proposed in the park could affect historic structures, buildings, and cultural landscape resources. Any site- specific planning and compliance actions associated with these actions would be performed in accordance with stipulations in the park's 1999 PA. Specific impacts, and the determination of effect, would depend upon the nature, location, and design of the facility to be developed or removed, as well as the quantity and data potential of the cultural landscape resource(s) affected.

Alternative 2. The cumulative impact analysis for historic structures, buildings, and cultural landscape resources under Alternative 2 is the same as described under Alternative 1.

Redevelopment of the Crane Flat campus would have an adverse effect on two historic properties, and no adverse effect on two historic properties.

Alternative 3. The cumulative impact analysis for historic structures, buildings, and cultural landscape resources under Alternative 3 is the same as described under Alternative 1.

Although development of the new Henness Ridge campus would have no effect on historic structures, buildings, and cultural landscape resources at Henness Ridge itself, the associated restoration of the Crane Flat campus would have an adverse effect on three historic properties, and no adverse effect on one historic property.

American Indian Traditional Cultural Practices

Alternative 1. Cumulative impacts to American Indian traditional cultural practices reflect the analysis of past, present, and reasonably foreseeable future actions in Yosemite National Park, in combination with potential effects under this alternative. American Indian traditional cultural practices have been lost or damaged in the Crane Flat area through past development, visitor use, natural events, and widespread disruption of cultural traditions. Nevertheless, Yosemite National Park retains many sites and resources of significance to local and culturally associated American Indians.

Although continued operation of the existing environmental education campus would not affect traditional cultural practices, reasonably foreseeable future actions proposed in the region that could affect American Indian traditional cultural practices would be performed in concert with ongoing consultation between the National Park Service and American Indians with traditional cultural ties to the area. Specific impacts would depend upon the nature, location, and design of the facility to be developed or removed, as well as the quantity and data potential of the American Indian traditional uses affected.

Alternative 2. The cumulative impact analysis for traditional cultural practices under Alternative 2 is the same as described under Alternative 1.

Although redevelopment of the Crane Flat campus would have no impact on traditional cultural practices, reasonably foreseeable future actions proposed in the region that could affect American Indian traditional cultural practices would be performed in concert with ongoing consultation between the National Park

Service and American Indians with traditional cultural ties to the area. Specific impacts would depend upon the nature, location, and design of the facility to be developed or removed, as well as the quantity and data potential of the American Indian traditional uses affected.

Alternative 3. The cumulative impact analysis for traditional cultural practices under Alternative 3 is the same as described under Alternative 1.

Although development of the new Henness Ridge campus would have a negligible impact on traditional cultural practices, restoration of the Crane Flat campus would have a long- term, beneficial impact to traditional cultural practices in that area, and reasonably foreseeable future actions proposed in the region that could affect American Indian traditional cultural practices would be performed in concert with ongoing consultation between the National Park Service and American Indians with traditional cultural ties to the area. Specific impacts would depend upon the nature, location, and design of the facility to be developed or removed, as well as the quantity and data potential of the American Indian traditional uses affected.

Visitor Experience and Recreation

Alternative 1. Cumulative effects on visitor experience and recreation would be minor because the localized adverse impacts would be partially offset by visitor experience improvements associated with other reasonably foreseeable and present actions in other locations (e.g., Yosemite Motels Expansion and Yosemite Museum Master Plan).

Alternative 2. No additional visitor experience or recreation related actions are proposed for the Crane Flat area. However, reasonably foreseeable and present actions are expected to improve the visitor experience in other park locations.

Under this alternative, the expanded educational facilities at the redeveloped YI campus at Crane Flat in combination with the other proposed action within the park would create a minor beneficial cumulative impact to visitor experience and recreation.

Alternative 3. No additional visitor experience– or recreation- related developments are proposed for the Henness Ridge area. However, reasonably foreseeable and present actions are expected to improve the visitor experience in other park locations.

Under this alternative, the expanded educational facilities at the new YI campus at Henness Ridge in combination with the other park actions would create a minor beneficial cumulative impact to visitor experience and recreation.

Restoration at Crane Flat under Alternative 3 would result in a negligible beneficial cumulative impact to visitor experience and recreation when combined with other projects that reduce impacts.

Park Operations and Facilities

Alternative 1. Cumulative effects on park operations and facilities are based on analysis of past, present, and reasonably foreseeable future actions in the immediate Yosemite National Park region, in combination with potential effects of this alternative. The extent to which past, present, or reasonably foreseeable actions could have a cumulative effect on NPS management is determined largely by whether such actions would affect demand for park operations services and facilities. Park operations services include maintenance of utility systems, provision of interpretation programs, visitor protection, and resource management.

Examples of actions that affect park operations and facilities include planning and implementation developments related to the *Parkwide Invasive Plant Management Plan*, the *Utilities Master Plan*, the *Yosemite Lodge Area Redevelopment Plan*, and the *Tuolumne Wild and Scenic River Comprehensive Management Plan*. These proposed actions have mixed adverse and beneficial effects on park operations. For example, comprehensive management plans have short- term adverse effects on park operations related to planning, but enable more effective and efficient management of park facilities, a long- term beneficial effect. Implementation of development actions such as the *Yosemite Lodge Area Redevelopment Plan* increases demand on park operations during the planning and construction phases and could increase long- term demand for various park operations services and facilities, but over the long term, such improvements reduce demand for maintenance and repair services.

These past, present, and reasonably foreseeable future actions could have adverse cumulative effects on park operations and facilities because of the increased demand on park operations services and facilities over both the short and long term. The cumulative impact of all actions would result in a local, long- term, moderate, adverse impact because of the increased demand for park operations services and facilities. Under the No-Action Alternative, the campus would contribute to the cumulative impacts.

Alternative 2. The cumulative impact analysis for park operations under Alternative 2 is anticipated to be similar to those described under Alternative 1. The environmental education campus is just one of many proposed actions currently ongoing and foreseeable at the park.

These past, present, and reasonably foreseeable future actions could have adverse cumulative effects on park operations and facilities because of the increased demand on park operations services and facilities over both the short and long terms. The cumulative impact of all actions would result in a local, long- term, moderate, adverse impact because of the increased demand for park operations services and facilities. However, because the reconstructed campus would contain state- of- the- art facilities and infrastructure, its incremental beneficial impact would reduce cumulative adverse impacts.

Alternative 3. The cumulative impact analysis for park operations under Alternative 3 is anticipated to be similar to those described under Alternative 1. The environmental education campus is just one of many proposed actions currently ongoing and foreseeable at the park.

These past, present, and reasonably foreseeable future actions could have adverse cumulative effects on park operations and facilities because of the increased demand on park operations services and facilities over both the short and long terms. The cumulative impact of all actions would result in a local, long- term, moderate, adverse impact because of the increased demand for park operations services and facilities. However, because the new campus would contain state- of- the- art facilities and infrastructure, its incremental benefical impact would reduce cumulative adverse impacst.

Restoration at Crane Flat under Alternative 3 would result in a minor beneficial cumulative impact to park operations when combined with other projects that eliminate or lessen needed maintenance costs.

Transportation

Alternative 1. Year 2030 traffic volumes were forecast for the No- Action Alternative cumulative effect using a 56% increase over the existing conditions (Omni- Means 2009). Therefore, Yosemite National Park would experience increased traffic volumes, even though implementation of the No- Action Alternative would only have minor effects on intersection operation levels.

Under Year 2030 conditions, the Wawona Road/Henness Ridge Road intersection would operate at LOS C during the p.m. peak hours, while all other intersections would operate at LOS B during p.m. peak hours. All intersections would operate at LOS B during a.m. peak hours. This is considered a moderate effect on intersection operations in the study area.

Yosemite National Park traffic volumes are at their lowest during the winter months. Because the TIAR analyzed the worst- case scenario for Alternative 1 Cumulative Conditions, the LOS for all four intersections would be the same or better under winter conditions. Implementation of Alternative 1 would have a moderate effect on intersection operations in the study area during the winter months.

All Yosemite National Park entrances would experience an increase in the entrance operations based on year 2030 traffic increases. Under Alternative 1 Cumulative Conditions, the traffic volumes would be increased slightly; the increases would reduce the LOS at the entrances. Visitors to the park would experience a slight delay. This would be a minor effect on entrance operations.

Under Alternative 1 Cumulative Conditions, all intersections would experience a decrease in LOS grade for at least one peak- hour period. This is a moderate effect; however, all intersections would continue to operate at acceptable LOS. All entrances to Yosemite National Park would experience minor effects on operation levels. The operation of intersections and entrances in Yosemite National Park would not be impaired.

Alternative 2. Cumulative conditions assume Year 2030 conditions and the concurrent operation of both the Crane Flat and Henness Ridge campus locations. Proposed development implementation would result in only one operational YI campus; therefore, this analysis presents the worst- case scenario for transportation (Omni- Means 2009).

Intersections would generally operate at LOS A or B. Only one intersection, Wawona Road/Henness Ridge Road, would operate at LOS C during p.m. peak hours. Cumulative effects would be moderate for the Wawona Road/Henness Ridge Road intersection, which would experience a decrease in LOS to LOS C. The remaining intersections would experience minor operation affects.

Yosemite National Park traffic volumes are at their lowest during the winter months. Because the TIAR analyzed the worst- case scenario, the LOS for the above intersections would be the same or better under winter conditions. Under Alternatives 2 and 3, Cumulative Conditions would have a minor to moderate effect on intersection operations in the study area during the winter months.

Yosemite National Park has five entrances, three of which would be used for the purposes of this alternative—the Big Oak Flat Entrance, South Entrance, and the Arch Rock Entrance. Based on the number discussed under Alternatives 2 and 3, trips generated during peak hours would result in each entrance experiencing between five and nine additional trips during the a.m. and p.m. peak hours. This low number would not affect the level of service at these entrances; however, regular visitors may experience a slight delay from previous visits. This would be a negligible cumulative effect on entrance operations.

Under Alternatives 2 and 3 Cumulative Conditions, all intersections would experience a decrease in LOS grade for at least one peak- hour period. This is a moderate effect; however, intersections would continue to operate at acceptable LOS. In addition, all intersections would operate at the same LOS with or without the proposed actions for Cumulative Conditions. Under Alternatives 2 and 3, Cumulative Conditions would have a negligible cumulative effect on entrance operations

Alternative 3. See Alternative 2 discussion.

Restoration at Crane Flat under Alternative 3 would result in a negligible beneficial cumulative impact to transportation when combined with other projects that reduce vehicular travel or increase efficiency.

Land Use

Alternative 1. Cumulative effects on land use would be negligible because the local minor impacts on affected management zones would not add to land use impacts of related actions in other locations.

Alternative 2. No additional development actions are proposed for other facilities within the Crane Flat development zone, such as the Tuolumne Grove trailhead, Crane Flat campground, and Crane Flat gas station. However, restoration efforts would have long-term beneficial effects on land use in the development and natural zone.

Redevelopment of the campus would disturb very few areas that have not already been affected by construction of the original Blister Rust Camp and the existing campus. Negligible cumulative impacts to land use are expected to occur under this alternative because the local minor impacts would not add to impacts from related actions in other locations.

Alternative 3. No additional development actions are proposed for the Chinquapin–Henness Ridge development zone, except the existing Glacier Point Road Rehabilitation project. The new campus at Henness Ridge would disturb approximately 16 acres in an area that previously supported logging, fire management, and road maintenance activities. Minor cumulative impacts to land use are expected to occur under this alternative because the local moderate impacts would not add to impacts from related actions in other locations.

Restoration at Crane Flat under Alternative 3 would result in a negligible beneficial cumulative impact to land use when combined with other restoration projects.

Community Values

Alternative 1. Cumulative impacts on community resources are based on analysis of past, present, and reasonably foreseeable future actions in the Yosemite National Park and four-county study area, in combination with potential effects under this alternative.

The Yosemite Motels Expansion project, a reasonably foreseeable action, would add 141 motel units and a large recreation building near El Portal at the Yosemite View Lodge. Development of this motel project could alleviate some of the high demand on employee and visitor housing; however, the development could result in cumulatively long-term, minor, adverse changes to community character as the demand for community services and infrastructure increases. The negligible impacts associated with the implementation of Alternative 1 would contribute to this cumulative impact.

Alternative 2. The cumulative impacts to community values under Alternative 2 are expected to be the same as described under Alternative 1.

Alternative 3. The cumulative impacts to community values under Alternative 3 are expected to be the same as described under Alternatives 1 and 2.

Restoration at Crane Flat under Alternative 3 would result in a negligible beneficial cumulative impact to community values when combined with other restoration projects.

Socioeconomics

Alternative 1. Cumulative impacts on socioeconomic conditions are based on analysis of past, present, and reasonably foreseeable future actions in the Yosemite National Park and four- county study, in combination with potential impacts under this alternative. The related actions identified in this cumulative analysis are those that could have a discernible effect on the region's socioeconomic conditions.

Socioeconomic cumulative impacts are expected to be dominated by the short- term impact of construction activities that would affect the region's construction industry and employment. It is important to note that construction impacts are generally short- term in nature, and their impacts last only for the duration of the construction period. As a result, scheduling of other construction actions would determine the magnitude of construction- related cumulative impacts. Future construction actions would have a beneficial cumulative impact on the regional economy by providing employment opportunities and bringing in additional construction spending to the region.

Reasonably foreseeable actions that would have a beneficial cumulative effect on the region's economy would be construction actions proposed under the NPS *Yosemite Valley Plan* (2000b), such as the Yosemite Motels Expansion project. Present actions that would cumulatively have a beneficial effect on the regional economy due to construction activities include, but are not limited to, development of the Indian Cultural Center, the Hodgdon Meadow Housing Area Trailer Replacement Project, Improvements to Curry Village and East Yosemite Valley Campgrounds, and Yosemite Lodge Area Redevelopment. Implementation and construction of some of these proposed actions could occur concurrently during the scheduled construction period for the environmental education campus.

Several planned environmental restoration efforts may be implemented during this same period, such as the Visitor Use and Floodplain Restoration in East Yosemite Valley Project, which could also have a beneficial cumulative impact on the local economy by increasing spending in the region and providing additional employment opportunities.

The combined effect of these cumulative actions is expected to result in a regional, short- term, moderate to major, beneficial impact on the regional economy from the increased spending and employment in the region. The above- identified short- and long- term beneficial impacts associated with the implementation of Alternative 1 would contribute to this effect.

Alternative 2. The cumulative impacts to socioeconomic conditions under Alternative 2 are expected to be the same as described under Alternative 1.

Alternative 3. The cumulative impacts to socioeconomic conditions under Alternative 3 are expected to be the same as described under Alternatives 1 and 2. The combined effect of cumulative actions is expected to result in a regional, short- term, moderate to major, beneficial impact on the regional economy from the increased spending and employment in the region. The implementation of Alternative 3 would contribute to this effect cumulatively.

Restoration at Crane Flat under Alternative 3 would result in a negligible beneficial cumulative impact to socioeconomics when combined with other restoration projects.

Global Climate Change

Scientific Studies. A series of reports issued by the United Nations Intergovernmental Panel on Climate Change (UNIPCC) has synthesized the results of recent scientific studies of climate change (UNIPCC 2007a, 2007b, 2000c). Key findings of these reports include the following:

- Global atmospheric concentrations of carbon dioxide, methane, and nitrous oxide have increased markedly as a result of human activities since 1750, and now far exceed pre- industrial levels. Global increases in carbon dioxide concentration are due primarily to fossil fuel use and land use change, and global increases in methane and nitrous oxide are due primarily to agriculture.
- Warming of the global climate due to greenhouse gases (GHGs) is unequivocal, as evidenced by increases in air and water temperatures, widespread melting of snow and ice, and rising global average sea level. Most of the increase in global average temperatures since the mid- 20th century is very likely due to increases in GHGs from human activities. GHG emissions increased 70 percent between 1970 and 2004.
- Numerous long- term climate changes observed have included changes in arctic temperatures and ice, precipitation, ocean salinity, wind pattern, and the frequency of extreme weather events such as droughts, heavy precipitation, heat waves, and tropical cyclone intensity.
- Continued GHG emissions at current rates would cause further warming and climate change during the 21st century that would very likely be larger than that observed in the twentieth century.
- Climate change is expected to have adverse impacts on water resources, ecosystems, food and forest products, coastal systems and low- lying areas, urban areas, and public health. These impacts would vary regionally.

California GHG Emissions and Climate Change. In California, the main sources of GHG emissions are from the transportation and energy sectors. According to the California Air Resources Board (ARB) draft GHG emission inventory for the year 2004, 39 percent of GHG emissions result from transportation and 25 percent of GHG emissions result from electricity generation. California produced 497 million metric tons of CO2 equivalent (MMtCO2e) in 2004 (ARB 2007). California produces about 2% of the world's GHG emissions.

The potential effects of future climate change on California resources include (California Climate Change Portal [CCCP] 2007):

- <u>Air temperature</u>: increases of 3 to 10.4 degrees Fahrenheit by the end of the century, depending on the aggressiveness of GHG emissions mitigation.
- <u>Sea level rise</u>: 6 to 30 inches by the end of the century, depending on the aggressiveness of GHG emissions mitigation.
- <u>Water resources</u>: reduced Sierra snowpack, reduced water supplies, increased water demands, changed flood hydrology.
- <u>Forests</u>: changed forest composition, geographic range, and forest health and productivity.
- <u>Ecosystems</u>: changed habitats, increased threats to certain endangered species.
- <u>Agriculture</u>: changed crop yields, increased irrigation demands.
- <u>Public health</u>: increased respiratory illness and weather- related mortality.

Yosemite National Park Climate Action Plan. Yosemite National Park participates in the Climate Friendly Parks Program implemented by the U.S. Environmental Protection Agency (EPA) and the National Park

Service, and has been designated a “Climate Friendly Partner.” To obtain this designation, Yosemite has conducted a baseline GHG emissions inventory, developed a Climate Action Plan (Yosemite National Park 2006), and committed to educating park staff, visitors, and community members about climate change.

In 2005, Yosemite’s GHG emissions from non- fire management activities totaled more than 16,000 MMtCO2e. Of this total, 64% was caused by mobile combustion, 21% by stationary combustion, and 10% by purchased electricity, with the remainder caused by other sources.

The objective of Yosemite’s Climate Action Plan is to identify actions that Yosemite can undertake to reduce GHG emissions and thus address climate change. A specific goal is to reduce non- fire management–related GHG emissions to 10% below 2005 levels by 2010 though implementing emission mitigation actions. The Plan recommends three strategies:

- Reduce fuel use and GHG emissions from park facilities and operations
- Increase climate change outreach and education efforts
- Perform subsequent emission inventories to evaluate progress and develop future emission mitigation actions

Alternatives 2 and 3 are consistent with and help implement the following Climate Action Plan energy use actions to reduce GHG emissions:

- Use alternative energy
- Increase lighting efficiency
- Promote energy- efficient facility construction and green design
- Optimize energy use

Impacts

Methodology

Sources of GHG emissions for the alternatives are the same as for criteria air pollutants (see Air Quality). GHG emissions for the alternatives have not been quantified because they represent a small proportion of parkwide emissions. GHG emissions from the alternatives would contribute to cumulative global climate change caused by global GHG emissions. However, cumulative impacts of the alternatives on global climate change are not considered significant because it is not possible to discern the effects of these emissions on global climate change.

Alternative 1. No construction- related GHG emissions would occur. Operation- related emissions would include stationary source emissions and mobile source emissions from traffic. The dining hall and student dormitories would continue to be heated by wood- burning stoves, which generate high GHG emissions relative to other heating fuels. Continued use of the existing campus would generate vehicle emissions from users traveling to and from the site.

Alternative 2. Construction- related GHG emissions would be generated by construction vehicles. Operation- related GHG emissions would be generated by stationary source emissions and mobile source emissions from increased traffic.

Operation of the redeveloped campus would result in an overall reduction in emissions of GHGs compared with Alternative 1 because wood- burning stoves would no longer be used for space heating. Instead, cleaner-burning gas wall heaters would be used, which would result in an overall decrease in emissions. Changing weather patterns that may result in less snow, more rain, and more frequent fire could over time affect facility maintenance and landscape design, though it is not certain whether these changes, if they indeed occur, would be pronounced enough over the life cycle of the facility (50+ years) to have an appreciable effect.

Alternative 3. Construction- related GHG emissions would be generated by construction vehicles at both the Henness Ridge and Crane Flat sites. Operation- related GHG emissions would be generated by stationary source emissions and mobile source emissions from increased traffic.

Operation of a campus at Henness Ridge would generate similar types of stationary source GHG emissions as the redeveloped Crane Flat campus due to similar designs and energy- efficient measures, including a photovoltaic system. Changing weather patterns that may result in less snow, more rain, and more frequent fire could over time affect facility maintenance and landscape design, though it is not certain whether these changes, if they indeed occur, would be pronounced enough over the life cycle of the facility (50+ years) to have an appreciable effect.

The effect of construction and/or operation under all three alternatives is expected to result in a regional, short- term, negligible, adverse impact on GHG emissions. The impact associated with the implementation of any of the alternatives would contribute to the cumulative impacts described above.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES AND SHORT- TERM USES OF THE ENVIRONMENT VERSUS LONG- TERM PRODUCTIVITY

Irreversible and Irretrievable Commitment of Resources

NEPA regulations (40 CFR 1502.16) require an EIS to address the irreversible and irretrievable commitment of resources caused by the alternatives. An *irreversible* commitment of resources is defined as the loss of future options. The term applies primarily to the effects of using nonrenewable resources (such as minerals or cultural resources) or resources that are renewable only over long periods (such as soil productivity). It could also apply to the loss of an experience as an indirect effect of a “permanent” change in the nature or character of the land. An *irretrievable* commitment of resources is defined as the loss of production, harvest, or use of natural resources; irretrievable resource commitments may or may not be irreversible.

The irretrievable and irreversible commitments of resources associated with Alternative 1 are limited to the consumption of energy resources during campus operations. Wood, electricity and propane consumption would continue under current conditions, and no effort would be made to alter these uses.

Alternative 2. Under Alternative 2, no appreciable irreversible or irretrievable commitments of resources would be associated with air quality, scenic resources, soundscape, visitor experience, transportation, community values, socioeconomics, or park operations. Nearby wet meadows would be adversely affected as a result of increased groundwater pumping for use at the campus; this represents an irretrievable commitment of this resource for at least the duration of campus operations. However, it would be possible to rehabilitate affected wetland areas and return them to their preconstruction state at some point in the future.

Soils and vegetation would be adversely affected as a result of the construction of new campus facilities; this represents an irretrievable commitment of this resource for at least the duration of campus operation. However, it would be possible to rehabilitate these impacted soil types and vegetation communities and return them to their preconstruction state at some point in the future. Wildlife habitat would be adversely affected as a result of the redevelopment and operation of campus facilities (including the highly valuable wet meadow habitat). Loss and degradation of habitat would affect the availability of food, cover, and reproductive sites for wildlife, and result in associated indirect human impacts from the use of the campus; this represents an irretrievable commitment of these resources for at least the duration of the campus. It would, however, be possible to restore affected habitats to some semblance of their preconstruction state at some point in the future. Adverse impacts on three special- status wildlife species and three special- status plant species would have an irreversible impact as long as campus operation causes local human disturbance. It would be possible to reverse these impacts at some future date if the development was removed and some semblance of the natural habitat was restored.

The removal of historic structures would have an irreversible impact. However, prior to the removal of these resources, documentation and data recovery would be completed, thus maintaining the historical record and limiting the impact to the loss of the physical structure and historic associations. Nonrenewable resources and energy consumed during the construction and operation of the campus represent irretrievable resource commitments.

Alternative 3. Under Alternative 3, no irreversible or irretrievable commitments of resources would be associated with air quality, scenic resources, soundscape, visitor experience, transportation, community values, socioeconomics, or park operations.

Soils and vegetation would be adversely affected as a result of the construction of the campus; this represents an irretrievable commitment of this resource for at least the duration of campus operation. However, it would be possible to rehabilitate these affected soil types and vegetation communities and return them to their preconstruction state at some point in the future. Wildlife habitat would be adversely affected as a result of the redevelopment and operation of campus facilities (including the highly valuable wet meadow habitat). Loss and degradation of habitat would affect the availability of food, cover, and reproductive sites for wildlife, and result in associated indirect human impacts from the use of the campus; this represents an irretrievable commitment of these resources for at least the duration of the campus. It would, however, be possible to restore affected habitats to some semblance of their preconstruction state at some point in the future.

The removal of historic structures plus the disturbance of archeological sites during restoration activities would have an irreversible impact. However, prior to the removal or disturbance of these resources, documentation and data recovery would be completed, thus maintaining the historical record and limiting the impact to the loss of the physical structure and historic associations. Nonrenewable resources and energy consumed during the construction and operation of the campus, and the restoration of Crane Flat represent irretrievable resource commitments.

THE RELATIONSHIP BETWEEN LOCAL SHORT- TERM USES OF THE HUMAN ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG- TERM PRODUCTIVITY

NEPA regulations (40 CFR 1502.16) require an EIS to consider the relationship between short- term uses of the environment and the maintenance and enhancement of long- term productivity. Special attention should be given to impacts that narrow the range of beneficial uses of the environment or pose a long- term risk to human health or safety.

Alternative 1: No Action

Under Alternative 1, the existing relationship of short- term uses of the environment and the maintenance and enhancement of long- term productivity would continue. For example, existing campus structures would remain within highly valued resource areas such as wet meadows. Student visitation and use levels would remain at existing conditions, and though program modifications have been made, would continue to have local, long- term, minor adverse impacts due to soil compaction and denuding of vegetation on the campus and surrounding areas. The impacts associated with the ongoing use of the site would continue to have long-term, minor, adverse impacts on productivity of fragile resources.

Alternative 2: Crane Flat Redevelopment

Short- term, minor adverse impacts to these resources would consist of construction- related impacts of new development activities (e.g., construction equipment, grading, increased erosion potential, and vegetation removal). The long- term productivity of these resources has the potential to be compromised by the growth in student numbers using the site, resulting in minor long- term loss through decreased size, integrity, and connectivity. The long- term productivity for these natural resources can be quantified as follows:

- **Water Resources:** Long- term productivity has the potential to be compromised as groundwater pumping would increase. The well pumping would be on a schedule to avoid or mitigate these effects.

- **Wetlands:** Increased groundwater pumping and student visitations to the wet meadows has the potential to result in impacts to long- term productivity of these valuable habitats.

- **Soils:** Construction activities would disturb soils and increase the likelihood of soil erosion. New campus facilities and increased student numbers would result in increased soil compaction.

- **Vegetation, Wildlife, and Special- status Species:** Increase in campus facility and size and increased student numbers would further contribute to loss of habit and would continue to have long- term minor adverse impacts on ecological productivity through decreased habitat availability, integrity, or avoidance for plants, wildlife, and special- status species.

- **Scenic Resources:** There would be short- term disruption of these resources during construction, however long- term impacts would likely be localized.

- **Energy Consumption:** In the short term, fuel consumption would increase as a result of construction activities; however, the use of green building technology would likely result in a decrease in per capita energy consumption, and long- term fuel consumption would be reduced.

Alternative 3: Henness Ridge Center

Short- term, minor adverse impacts to these resources at Henness Ridge would consist of construction- related impacts of development activities (e.g., construction equipment, grading, increased erosion potential, and vegetation removal). The long- term productivity of these resources at Henness Ridge has the potential to be compromised by the presence of large groups of students and campus facilities resulting in loss through decreased size, integrity, and connectivity in the absence of mitigation. However, mitigation integral to this alternative includes a condensed campus footprint, restoration of Crane Flat, and removal of impediments to a 64- acre wilderness addition across from Henness Ridge at Indian Creek. Short- term, minor, adverse impacts to these resources would consist of impacts from restoration activities (e.g., demolition equipment, grading, increased erosion potential). The long- term productivity of these resources would be enhanced through increased size, integrity, and connectivity. The long- term or net gains for these natural resources can be quantified as follows:

- **Water Resources:** The development of the campus at Henness Ridge would result in short- term impacts caused by increased erosion during construction activities. Long- term productivity would only have negligible impacts from campus wastewater. Removal of campus facilities at Crane would result in short- term impacts caused by increased erosion during demolition activities. However, the beneficial impacts of the long- term restoration of the natural hydrologic processes and the cessation of campus- related groundwater pumping would outweigh these adverse impacts.

- **Wetlands:** Beyond the campus footprint at Henness Ridge is a sensitive meadow. YI programs will adhere to strict guidelines to avoid adverse impacts to this meadow (See Table 2- 10. Therefore, no impacts to long- term productivity of this valuable habitat are expected. However, the restoration of Crane Flat and the cessation of campus activities at that site would have long- term beneficial impacts to the ecological productivity of the Crane Flat.

- **Soils:** Construction activities at Henness Ridge would disturb soils and increase the likelihood of soil erosion. The presence of campus facilities and large numbers of student groups would result in increased soil compaction. However, the restoration of Crane Flat would result in long- term restoration of soils.

- **Vegetation, Wildlife, and Special- status Species:** Construction activities at Henness Ridge would result in disturbance and loss of vegetation and habitat. The presence of campus facilities and large numbers of students would result in local, long- term minor adverse impacts on ecological productivity through decreased habitat availability, integrity, or avoidance for plants, wildlife and special- status species. The restoration of Crane Flat and protection of Indian Creek would increase habitat availability, integrity, and continuity for plants, wildlife and special- status species.

- **Scenic Resources:** There would be short- term disruption of these resources at Henness Ridge during construction; however, long- term impacts would likely be localized. The short- term disruption of these resources at Crane Flat during the restoration activities would be more than offset by the long- term enhancement and preservation of scenic resources.

- **Energy Consumption:** In the short term, fuel consumption would increase as a result of construction activities at Henness Ridge; however, the use of green building technology would likely result in a decrease in per capita energy consumption, and long- term fuel consumption would be reduced. In the short term, fuel consumption would increase as a result of restoration activities at Crane Flat; however, after completion, the long- term fuel consumption from campus- related activities would be eliminated.

CHAPTER 4: CONSULTATION AND COORDINATION

SCOPING HISTORY

The formal public scoping period for the Environmental Education Campus Development Program at Crane Flat/Draft Environmental Impact Statement began on September 20, 2002, when a Yosemite National Park press release was sent to local and regional newspapers announcing the opening of public scoping on the Environmental Education Campus Development Program at Crane Flat/Draft Environmental Impact Statement. A Notice of Intent was published in the *Federal Register* on September 30, 2002, initiating a 45- day public scoping period. Scoping comments were accepted through November 14, 2002. During the scoping period, the National Park Service held discussions and briefings with: tribes, park staff, elected officials, public service organizations, and other interested members of the public.

The park conducted many public meetings about this project, including those on June 26 and June 29, 2002 at the East Auditorium in Yosemite Valley, and a site tour at the existing campus on June 29, 2002. Additional public meetings were held on July 20, August 21, and September 21, 2002, and February 26, March 28, and April 23, 2003. Detailed information on meeting locations and times was published in local and regional newspapers in advance and listed on the park's web page. Yosemite National Park management and planning officials attended these sessions to present the Environmental Education Campus Development Program at Crane Flat, receive oral and written comments, and answer questions.

In May 2003, an administrative draft EIS was produced for review by park staff, and draft concepts were presented to the public. However, during scoping, the park received comments from the public and park staff regarding concerns about possible impacts to sensitive areas and natural resources and suggested that a wider range of alternatives be considered. In response to these issues and concerns, the project team continued to collect and analyze resource data for the Crane Flat area (i.e., vegetation, wildlife, hydrologic, and cultural resource data) and expanded its range of options to consider 11 additional sites. The park conducted a Choosing by Advantage (CBA) workshop in 2006 to select another viable location, and selected Henness Ridge as an additional site for analysis in the EIS.

In April 2006, NPS staff (representing a broad range of disciplines) and Yosemite Institute staff participated internal scoping facilitate by a CBA workshop. Using an established set of criteria, the group evaluated site suitability and ranked the 11 sites as to whether they would be reasonable, feasible, and meet the project purpose and need. One of the potential additional sites at Henness Ridge, the "Sand Lot," ranked far above all other sites in meeting the project's objectives. The project team presented the workshop results to park management, and a decision has been made to include the Henness Ridge site as an alternative for full analysis in the EIS. The park and Naturebridge have been engaged in on- going dialogue with the interested public, and provided regular updates to and meetings with Yosemite West homeowners association throughout the project. More public involvement activities are scheduled as part of the National Environmental Policy Act (NEPA) process.

The Draft EIS was made available to the public, federal, state, and local agencies and organizations in May 2009, with a 60- day public review period during which the public and agencies were able to provide comment on the draft. A press release distributed to a wide variety of news media, direct mailing, placement on the park's website and announcements in Yosemite Planning Update Newsletters, as well as in local public libraries announced the availability of the Draft EIS. Responses to comments received have been included in this Final EIS and Record of Decision.

AGENCY CONSULTATION

American Indian Consultation

Yosemite National Park is conducting ongoing consultations with American Indian tribes having cultural association with Yosemite National Park and the Crane Flat and Henness Ridge areas, including the American Indian Council of Mariposa County, Inc. (AICMC) (aka Southern Sierra Miwuk Nation), the Tuolumne Band of Me- Wuk Indians, the North Fork Rancheria of Mono Indians, Picayune Rancheria of the Chukchansi Indians and the Mono Lake Kutzadika[a] Tribe.

Tribes are being provided with a copy of this EIS, and consultation and partnering will continue throughout implementation of the project, if approved.

California State Historic Preservation Officer/Advisory Council on Historic Preservation

The *1999 Park Programmatic Agreement Among The National Park Service At Yosemite, The California State Historic Preservation Officer and The Advisory Council On Historic Preservation Regarding Planning, Design, Construction, Operations And Maintenance, Yosemite National Park, California* (1999 PA) (Appendix A) was developed among NPS at Yosemite, the California State Historic Preservation Officer, and the Advisory Council on Historic Preservation, in consultation with American Indian tribes and the public and stipulates methods for the Park to carry out its responsibilities under Section 106 of the NHPA.

For the purpose of NEPA and NPS policy, an impact to a historic property that is eligible or listed under the National Register of Historic Places would be considered significant if an adverse affect could not be resolved in agreement with the State Historic Preservation Officer (SHPO), Advisory Council on Historic Preservation (ACHP), American Indian tribal governments, or other consulting and interested parties and the public. Consultation with SHPO is required to resolve adverse effects by implementation of standard mitigation measures, pursuant to Stipulation VIII of the 1999 PA.

Central Valley Regional Water Quality Control Board

The State Water Resources Control Board (SWRCB) and the nine Regional Water Quality Control Boards (RWQCBs) are the regulatory boards within California's Environmental Protection Agency which derive their authority from Section 401 of the Clean Water Act. The SWRCB allocates rights to the use of surface water and, along with the RWQCBs are charged with protecting surface, ground, and coastal waters throughout the state. The RWQCBs issue permits which govern and restrict the amount of pollutants that can be discharged into the ground or surface water, which includes regulating stormwater during construction activities. Yosemite National Park is under the jurisdiction of Regional Board (5), Central Valley, and therefore consults with and obtains any necessary permits and/or certifications for construction activities from the Central Valley RWQCB.

The National Park Service is currently coordinating with the Central Valley RWQCB to obtain a Water Quality Certification (WQC) for the campus development project. A WQC stipulates requirements for water quality protection during reconstruction activities, such as calling for compliance with Best Management Practices (BMPs) during construction such as proper storage of materials in staging areas to avoid erosion during storm events. The Park will prepare and submit a Stormwater Pollution Prevention Plan prior to construction.

U.S. Army Corps of Engineers

This EIS has determined that Alternatives 1, 2, and 3 will not adversely affect waters of the United States or special aquatic sites in such a manner that would require a permit from the U.S. Army Corps of Engineers (USCOE). The National Park Service has notified the USCOE of this finding and has requested the agency review these findings and return a letter concurring with this determination.

U.S. Fish and Wildlife Service

The Endangered Species Act of 1973, as amended (16 United States Code [USC] 1531 et seq.), requires all federal agencies to consult with the U.S. Fish and Wildlife Service to ensure that any action authorized, funded, or carried out by the agency does not jeopardize the continued existence of listed species or adversely modify critical habitat. The National Park Service requested a list of federally listed endangered and threatened species that may be present at Crane Flat in 2002 . In 2006, the NPS updated the list to include Henness and requested a new species list to include the Henness Ridge site. The list was received from the U.S. Fish and Wildlife Service on June 23, 2008, and updated on January 23, 2009. The NPS reviewed these lists to determine whether these species were known to occur in the park, and the lists were used as a basis for the special- status analysis in this EIS. The alternatives will not adversely affect species that are federally listed as threatened or endangered. The U.S. Fish and Wildlife Service reviewed the Draft EIS and concurred with this determination and recommended that if special- status species are encountered during project implementation, to re- initiate consultation at that time (personal communication, Ann Roberts, July 2009).

EIS PUBLICATION AND DISTRIBUTION

Copies of the YI Environmental Education Campus EIS are being distributed to those that have commented on the Draft EIS, as well as to congressional delegations, state and local elected officials, federal agencies, federally recognized tribes, organizations and local businesses, public libraries, and the news media (Appendix I). This document can be reviewed online at www.nps.gov/yose/planning. Requests for copies of this EIS should be directed to:

Mail: Superintendent, Yosemite National Park
ATTN.: YI Environmental Education Campus EIS
P.O. Box 577
Yosemite, California 95389

Phone: 209- 379- 1365; Fax: 209- 379- 1294

E- mail: Yose_Planning@nps.gov

Copies may also be obtained at our public Open Houses held on the last Wednesday of every month in the East Auditorium in Yosemite Valley, from 1 to 4 pm. Park staff will be on hand to answer questions and provide more information regarding this EIS as well as other Yosemite National Park planning efforts.

Next Steps

This EIS will be used by the National Park Service to reach an informed decision regarding the proposed action. The agency's decision will be noticed in the Federal Register, followed by a 30- day no- action period. If approved, this document will guide construction of a new campus at Henness Ridge, and restoration of the Crane Flat campus.

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CHAPTER 5: LIST OF PREPARERS

Table 5-1. List of Preparers and Reviewers

Name	Responsibility	Education	Years Experience
National Park Service, Yosemite National Park			
David V. Uberuaga	Acting Superintendent	M. Business Administration B.A. Biology	25 NPS
Michael J. Tollefson	Former Superintendent (2003-2009)	B.A. Business Administration (Marketing and Finance)	33 NPS
Linda Dahl	Former Chief of Planning	B.S. City and Regional Planning Graduate work in Environmental Sciences	14 NPS 26 other
Mark Butler	Chief, Division of Project Management	M.P.A. Public Administration B.S. Soils and Water Science	27 NPS 2 other
Bill Delaney	Former Chief, Division of Project Management	B.S. Civil Engineering, Registered Professional Engineer	29 NPS
Dennis Mattiuzzi	Former Chief, Division of Facilities Management	A.A. Business Administration	7 NPS 32 other
Thomas R. Medema	Chief, Division of Interpretation and Education, Liaison to Yosemite Institute	M.S. Parks & Recreation Mgt. B.S. Outdoor Recreation & Education	17 NPS
Niki Nicholas	Chief, Division of Resources Management and Science	Ph.D. Forestry, M.S. Ecology, B.A. Biology	3 NPS 18 other
Steve Schackelton	Chief Ranger, Protection Div.	B.S. & M.S. Criminology M.P.A. Public Administration	32 NPS 6 other
Chris Stein	Former Chief, Interpretation and Education, Liaison to Yosemite Institute	B.S. Outdoor Recreation (Park Management & Interpretive Planning)	30 NPS
Yosemite National Park Technical Experts and Contributors			
Lisa Acree	Botany Program Manager	B.A. Environmental Studies	18 NPS
Jim Allen	Utilities Specialist	DHS Water Certified RWQCB WW Certified	12 public 4 other
Bernadette Barthelenghi	Former Project Manager	B.S. Landscape Architecture, Minor in Environmental Planning	2 NPS 14 public
Sue Beatty	Restoration Biologist	B.S. Recreation, Graduate work in Natural Resources Management	27 NPS
Tony Brochini	Facilities Management Liaison	H.S. Graduate	31 NPS
Sueann Brown	Park Historic Architect	B. Architecture, M.S. Historic Preservation	4 NPS 20 other
Dennis Dozier	Wawona Roads Foreman	2 years Undergraduate studies	21 NPS
Mark Fincher	Wilderness Specialist	B.A Geography and Environmental Studies	18 NPS
Randy Fong	Branch Chief, Design	B.A. Architecture M. Architecture	32 NPS 1 other
Sarah Henderson	Administrative Support	H.S. Graduate	3 NPS 30 other

Table 5-1. List of Preparers and Reviewers

Name	Responsibility	Education	Years Experience
Dave Humphrey	Branch Chief, History, Architecture, and Landscapes	B.S. Landscape Architecture	21 NPS 6 public, 3 other
Laura Kirn	Park Archeologist	B.S. Anthropology	20 NPS
Carol Knipper	Division Liaison, Resources Management and Science	B.S. Natural Resource Management	23 NPS
Paul Laymon	Utilities Specialist	2 yrs. Undergraduate studies	25 NPS 7 other
Calvin Liu	Management Analyst, Outreach Specialist	B.A. Outdoor Recreation	23 NPS
Tim Ludington	Roads and Trails Foreman Park Operations	2 years Undergraduate studies	32 NPS
Kelly Martin	Chief, Fire & Aviation Management	B.S. Outdoor Education, Natural Resources Management	9 NPS 17 USFS
Brian Mattos	Park Forester	B.S. Forest Resources Management, Registered Professional Forester	26 NPS and USFS
Jeffrey Maurer	Wildlife Biologist	B.S. Physics M.S. Avian Sciences	3 NPS 10 other
Joe Meyer	Branch Chief, Physical Resources and Geographic Information System	B.S. Biology	17 NPS 3 other
Jen Nersesian	Former Public Involvement and Outreach Coordinator	M.P.P. Public Policy B.A. Philosophy	4 NPS 12 other
Ann Roberts	NEPA Compliance Specialist, USFWS consultation coordinator, technical reviewer	M.S. Forestry-Ecological Restoration B.S. Wildlife	4 NPS 6 USFS 5 other public
Jim Roche	Park Hydrologist	M.S. Geology B.S. Chemistry	8 NPS 3 other
Donald Schweizer	Restoration Ecologist	M.S. Hydrology	15 NPS
Jeannette Simons	Park Historic Preservation Officer and American Indian Liaison	M.A. Anthropology B.A. Anthropology	14 Public 14 Private
Sarah Stock	Wildlife Biologist, special status species evaluations	M.S. Zoology B.S. Ecology	2 NPS 11 other
Gretchen Stromberg	Current Project Manager	M.L.A Landscape Architecture B.A. Anthropology	8 NPS 6 other
Steve Thompson	Branch Chief, Wildlife Management	M.S. Ecology – Wildlife B.S. Biology	21 NPS 5 other
Wendy Vittands	Former Compliance Specialist	B.S. Environmental Science	4 NPS, 5 other
Katie Warner	Air Quality Specialist, Night Sky	B.A. Environmental Studies	17 NPS
Judi Weaser	Branch Chief, Vegetation and Restoration	M.S. Community Development B.S. Zoology	3 NPS 16 Public

Table 5-1. List of Preparers and Reviewers

Name	Responsibility	Education	Years Experience
SWCA Environmental Consultants			
Al Herson	Former Principal in Charge Technical Review	J.D. McGeorge School of Law M.S. Urban Planning B.A. Psychology	28 Private
Keith Pohs	Project Manager - Draft EIS Geology and Soils	M.S. Earth Science B.A. Geology	5 Private/6 Public
Leslie Wagner	Assistant Project Manager – Draft EIS	B.S. Wildlife Biology	6 Private
Peter T. Masson	Project Manager – Final EIS	B.S., Biology	20 Private
James Feldmann	Project Manager – Final EIS, Wilderness, Recreation, Land Use	M.S. Planning – Natural Resource Management B.B.A. Business Administration	7 Private
Shawna Scott	Assistant Project Manager – Final EIS	B.S. Natural Resources	8 Private/2 Public
Harmony Hall	Wildlife/Rare, Threatened, and Endangered Species/Energy/Park Operations	B.S. Natural Resources	8 Private
Megan Roberston	Planning	B.S. Planning	1 Private
Christa Redd	Transportation	M.S. Environmental and Natural Resources B.S. Environmental Science	10 Private
Jeff Connell	Socioeconomics	M.A. Public Administration B.S. Urban and Regional Studies	18 Public, 12 Private
Cara Bellavia	Socioeconomics	B.A. Anthropology M.A. Urban and Environmental Planning candidate	11 Private
David Harris	Visual Resources	M.S. Environmental Science B.A. English	12 Private
Keith Miller	Air Quality	B.S. Engineering M.C.R.P. Planning – Environmental	5 Public 5 Private
Doug Davidson	Hydrology	B.S. Environmental Science – Hydrology	19 Private
DeAnne Rietz	Water Quality	B.S. Hydrology	12 Private
Taya Cummins	Botany/Wetlands	M.S. Biology (in progress) B.S. Forestry and Natural Resources Management	5 Private
Geoff Soroka	Terrestrial Biology	B.S. Ecology and Evolutionary Biology	10 Private
Nancy Sikes	Cultural Resources	Ph.D. Anthropology M.A. Anthropology B.A. Anthropology/Museology	20 Private
Ben Gaddis	Alternatives Workshop Facilitation/Public Involvement	M.E.M. Water and Air Resources M.A.T. General Science B.S. Environmental Science	7 Private
Michelle Treviño	Document Editing/Formatting	M.A. Art History and Archaeology B.A. Art History and English	14 Private

Table 5-1. List of Preparers and Reviewers

Name	Responsibility	Education	Years Experience
Glenn Dunno	Maps and Graphics/GIS	M.S. Geography	15 Private
David Cao	GIS	B.S. Environmental Biology and Environmental Management	6 Private
Pacific Legacy			
Robert Jackson	Cultural Resources	M.A. Anthropology B.A. Environmental Studies	22 Private 6 Public
John Holson	Cultural Resources	M.S. Cultural Resources Management B.A. Anthropology	34 Private
Ambient Air and Noise Consulting			
Kurt Legleiter	Air Quality/Noise	B.S. Environmental Health Science B.A. Urban and Environmental Planning	10 Private
Omni-Means			
Gary Mills	Traffic Impact Study	B.A. Urban Studies and Planning	
Lisa Wallis	Traffic impact Study	B.S. Electrical Engineering	18 Private
Estep Environmental Consulting			
Jim Estep	Rare, Threatened, and Endangered Species		22 Private 5 Public

CHAPTER 6: GLOSSARY AND ACRONYMS

GLOSSARY OF TERMS

Affected environment: Existing biological, physical, social, and economic conditions of an area that are subject to change, both directly and indirectly, as a result of a proposed human action.

Alluvium: A general term for clay, silt, sand, gravel, or similar unconsolidated rock fragments or particles deposited during comparatively recent geologic time by a stream or other body of running water.

Alternatives: Sets of management elements that represent a range of options for a proposed project, which include options for campus location, building location, and how, or whether, to proceed. This environmental impact statement analyzes the potential environmental and social impacts of the range of alternatives presented.

Aquifer: A geologic formation that contains sufficient saturated permeable material to yield significant quantities of water to wells and springs.

Area of Potential Effect (APE): The geographic area or areas where an undertaking has potential to affect historic properties. Consider physical, visual, auditory and atmospheric effects; potential changes in land or building use, change in the setting and potential for neglect.

Basin: Refers to a drainage basin. A region or area bounded by a drainage divide and occupied by a drainage system. Specifically, an area that gathers water originating as precipitation and contributes it to a particular stream channel or system of channels. Synonym: watershed.

Best Management Practices: Effective, feasible (including technological, economic, and institutional considerations) conservation practices and land- and water- management measures that avoid or minimize adverse impacts to natural and cultural resources. Best Management Practices may include schedules for activities, prohibitions, maintenance guidelines, and other management practices.

Biodiversity: Biodiversity, or biological diversity, is generally accepted to include genetic diversity within species, species diversity, and a full range of biological community types. The concept is that a landscape is healthy when it includes stable populations of native species that are well distributed across the landscape.

Critical habitat: The area of land and water with physical and biological features essential to the conservation of federally listed threatened and endangered species and which may require special management considerations or protection.

Crownsprout: An adaptation of plants to produce new growth from a stump or burl typically damaged by cutting or fire. New growth often appears as circular or crown- like.

Cultural Resources: The broad category of socio- cultural resources and historic properties that reflect the relationship of people with their environment.

Day visitor: Visitors that do not stay overnight in the park. Includes both local overnighters and day excursion visitors.

Ecosystem: An ecosystem can be defined as a geographically identifiable area that encompasses unique physical and biological characteristics. It is the sum of the plant community, animal community, and environment in a particular region or habitat.

El Portal Administrative Site: The area outside the western boundary of the park along Highway 140 under the jurisdiction of the National Park Service used to locate park operations and administrative facilities for Yosemite National Park.

Emergent wetland: A wetland characterized by frequent or continual inundation dominated by herbaceous species of plants typically rooted underwater and emerging into air (e.g., cattails, rushes). The emergent wetland class is characterized by erect, rooted, herbaceous hydrophytes (e.g., cattails, rushes), excluding mosses and lichens. This vegetation is present for most of the growing season in most years. Perennial plants usually dominate these wetlands. All water regimes are included, except sub- tidal and irregularly exposed.

Environmental impact statement (EIS): A public document required under the National Environmental Policy Act that identifies and analyzes activities that might have a significant impact on the human and natural environment.

Excavator: A piece of heavy equipment that is used to dig or scoop material with a bucket attached to a hinged pole and a boom.

Facilities: Buildings and the associated supporting infrastructure such as roads, trails, and utilities.

Fire return interval: The typical period of time between naturally occurring fires.

Floodplain: A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Grader: A piece of heavy equipment used to level or smooth road or other surfaces to desired gradient.

Granitic rocks: Igneous rocks (intrusive magma) that have cooled slowly below the Earth's surface typically consisting of quartz, feldspar, and mica. In contrast to granitic rocks, if magma erupts at the Earth's surface, it is referred to as lava. Lava, when cooled, forms volcanic rocks.

Hazardous material: A substance or combination of substances, that, because of quantity, concentration, or physical, chemical, or infectious characteristics, may either: (1) cause or significantly contribute to an increase in mortality or an increase in serious, irreversible, or incapacitating illness; or (2) pose a substantial present or potential hazard to human health or environment when improperly treated, stored, transported, disposed of, or otherwise managed.

Hazardous waste: Hazardous wastes are hazardous materials that no longer have practical use, such as substances that have been discarded, spilled, or contaminated, or that are being stored temporarily prior to proper disposal.

Headwaters: The point or area of origin for a river or stream.

Historic and Cultural Resources: Under NEPA, culturally valued pieces of real property (not historic properties) and non- tangible values such as cultural use of the biophysical and built environments, and sociocultural attributes such as social cohesion, lifeways, religious practice and other social institutions (40 CFR 1508.27(b)(3)).

Historic Properties: Under NHPA and NEPA, a prehistoric or historic district, site, building, structure, object, landscape, or traditional cultural resource to which American Indians attach cultural and religious significance that is listed in, or eligible for listing in, the NRHP (36 CFR 800.16(l)(1) 40 CFR 1508.27(b)(8)).

Mitigation: Activities that will avoid, reduce the severity of, or eliminate an adverse environmental impact.

National Environmental Policy Act (NEPA): The federal act that sets national environmental policies and requires preparation of an EIS for major federal actions that may significantly affect the quality of the human environment.

Natural processes: All processes (such as hydrologic, geologic, ecosystemic) that are not the result of human manipulation.

Net-zero energy: Consumption of energy for a facility is no more than the energy produced by the facility in a given year.

No-Action Alternative: The alternative in an EIS that proposes to continue current management direction. "No action" means the proposed activity would not take place, and the resulting environmental effects from taking no action would be compared with the effects of permitting the proposed activity or an alternative activity to go forward.

Non-native species: Species of plants or wildlife that are not native to a particular area and often interfere with natural biological systems.

Particulate matter (PM-10 and PM-2.5): Fractions of particulate matter characterized by particles with diameters of 10 microns or less (PM-10) or 2.5 microns or less (PM-2.5). Such particles can be inhaled into the air passages and the lungs and can cause adverse health effects. High levels of PM-2.5 are also associated with regional haze and visibility impairment.

Pristine: Unaltered, unpolluted by humans.

Protohistoric: Immediately before written history.

Record of Decision (ROD): The public document describing the decision made on selecting the "preferred alternative" in an environmental impact statement. See "environmental impact statement."

Riparian areas: The land area and associated vegetation bordering a stream or river.

Riverine: Of or relating to a river. A riverine system includes all wetlands and deepwater habitats contained within a channel, with two exceptions: (1) wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens, and (2) habitats with water containing ocean-derived salts in excess of 0.5%. A channel is an open conduit either naturally or artificially created which periodically or continuously contains moving water, or which forms a connecting link between two bodies of standing water.

Sediment: A particle of soil or rock that was dislodged, entrained, and deposited by surface runoff or a stream. The particle can range in size from microscopic to cobble stones.

Snag: A standing dead tree.

Socio-Cultural Resources: Under NEPA, culturally valued pieces of real property (not historic properties) and non-tangible values such as social use of the biophysical and built environments and socio-cultural attributes such as social cohesion, lifeways, religious practice and other social institutions (40 CFR 1508.27(b)(3)), including those that may have acquired an historical relevance by virtue of their continued use over time but do not meet the NR standards to qualify as historic properties (see Historic and Cultural Resources above).

Succession: The process by which vegetation recovers following a disturbance or initially develops on an unvegetated site.

Threatened and endangered species: Species of plants that receive special protection under state and/or federal laws. Also referred to as "listed species" or "endangered species."

Traditional Cultural Properties: A resource to which American Indian tribes attach cultural and religious significance that is eligible for listing or listed in the NR and includes structures, objects, districts, geological and geographical features and archaeology. National Register Bulletin 38 provides guidance for identifying and evaluating such properties for eligibility.

Traditional cultural resource: Any site, structure, object, landscape, or natural resource feature assigned traditional, legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it.

User capacity: As it applies to parks, user capacity is the type and level of visitor use that can be accommodated while sustaining the desired resource and social conditions based on the purpose and objectives of a park unit.

Visitor experience: The perceptions, feelings, and reactions a park visitor has in relationship with the surrounding environment.

Watershed: The region drained by, or contributing water to, a stream, lake, or other body of water. Synonym: basin or drainage basin.

Wetland: Wetlands are defined by the U.S. Army Corps of Engineers (Code of Federal Regulations, Section 328.3[b], 1986) as those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands, as defined by the U.S. Fish and Wildlife Service (often referred to as the Cowardin classification system) and adopted by the National Park Service, are lands in transition between terrestrial and aquatic systems, where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this classification, wetlands must have one or more of the following attributes: the land supports predominantly hydrophytes, at least periodically; the substrate is predominantly undrained hydric soils; and/or the substrate is saturated with water or covered by shallow water at some time during the growing season of each year.

Wilderness: Those areas protected by the provisions of the 1964 Wilderness Act. These areas are characterized by a lack of human interference in natural processes.

Wilderness Act of 1964: The Wilderness Act restricts development and activities to maintain certain places where wilderness conditions predominates.

ACRONYMS

ACHP	Advisory Council on Historic Preservation
ADA	Americans with Disabilities Act
AIRFA	American Indian Religious Freedom Act of 1979
APE	Area of potential effects
ARPA	Archeological Resources Protection Act of 1979
BLM	Bureau of Land Management
BMP	Best Management Practices
CARB	California Air Resources Board
CalEPA	California Environmental Protection Agency
CBA	Choosing by Advantage
CCC	Civilian Conservation Corps
CDFG	California Department of Fish and Game
CDMG	California Department of Mines and Geology
CDWR	California Department of Water Resources
CEDD	California Employment Development Department
CEQ	Council on Environmental Quality
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
CNDDB	California Natural Diversity Database
USCOE/Corps	U.S. Army Corps of Engineers
dB	decibels
dBA	Decibels on the “A”- weighted scale
dbh	diameter at breast height
DO	Director’s Order
DOE	Determination of Eligibility
DNC	Delaware North Companies

EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FHWA	Federal Highway Administration
FSC	Forest Stewardship Council
gpd	gallons per day
gpm	gallons per minute
HABS	Historic American Buildings Survey
HAER	Historic American Engineering Record
LED	light- emitting diode
LEED	Leadership in Energy and Environmental Design
Ldn	day- night average sound level
Leq	energy equivalent level
Lmax	maximum A- weighted noise level
LOS	level of service
MAPS	Monitoring Avian Productivity and Survivorship
msl	mean sea level
NAGPRA	Native American Graves Protection and Repatriation Act
NEPA	National Environmental Policy Act
NFPA	National Fire Protection Act
NHPA	National Historic Preservation Act
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
PA	Programmatic Agreement
PL	Public Law
PM- 10	particulate matter less than 10 microns

ROD	Record of Decision
RWQCB	Regional Water Quality Control Board
SHPO	State Historic Preservation Officer
SMM	standard mitigating measures
SIP	State Implementation Plan
SWPPP	Stormwater Pollution Prevention Plan
TCP	Traditional Cultural Properties
USA	Underground Services Act
USC	United States Code
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VERP	Visitor Experience and Resource Protection
WQC	Water Quality Certification
WUI	wildland- urban interface
YVP	Yosemite Valley Plan

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CHAPTER 7: BIBLIOGRAPHY

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