

## Categorical Exclusion

(Version: FEB06)

Compliance Tracking Number: 2006-068

PEPC Project Number: 15889

### A. PROJECT INFORMATION

**Title:** Tuolumne Meadows Hydrologic Impacts Study

**Location:** Tuolumne Meadows, Tuolumne County, California

**Project Manager:** Jim Roche, Resources Management and Science, Yosemite National Park

### B. COMPLIANCE DETERMINATION

This project is an action that has been determined to result in no measurable environmental effects. It is therefore categorically excluded from further National Environmental Policy Act analysis under Categorical Exclusion: DO12 3.4 E (6) - *Non-destructive data collection, inventory (including field, aerial, and satellite surveying and mapping), study, research, and monitoring activities.*

Necessary compliance coordination has been completed regarding the National Historic Preservation Act, the Wilderness Act, the Wild and Scenic Rivers Act, and the Endangered Species Act, as applicable. Environmental impacts will be minor or less when the project is implemented with the conditions stipulated under **Project Mitigations and Conditions** in **Section I** at the end of the attached *Environmental Screening Form*.

Additional supporting information for this determination and the stipulated conditions can be found in the following attachments (when checked):

- Cultural Resource Effects Assessment Form (XXX)*
- Wilderness Minimum Requirement Analysis*
- Wild and Scenic River Section 7 Determination*
- Park Management Terms and Conditions*
- Other:

### C. DECISION

*On the basis of the environmental impact information in the statutory compliance file, with which I am familiar, I am categorically excluding the described project from further NEPA analysis. No exceptional circumstances or conditions in DO12 3.5 or 3.6 apply and the action is fully described in DO12, Section 3.4.*

*//R. Kevin Cann//*

for Michael J. Tollefson

6/15/06

Date

Original: Statutory Compliance File  
cc: Project Proponent

Attachments (2)

*The signed original of this document is on file at  
the Environmental Planning and Compliance  
Office in Yosemite National Park.*



# 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)

## Memorandum

To: Jim Roche, Project Manager, Resources Management and Science, Yosemite National Park

From: Superintendent, Yosemite National Park

Subject: Notice to Proceed, 2006-068 Tuolumne Meadows Hydrologic Impacts Study (15889)

Your proposed project is an action that has been determined to result in no measurable environmental effects. It is therefore categorically excluded from further National Environmental Policy Act analysis under Categorical Exclusion: DO12 3.4 E (6) - *Non-destructive data collection, inventory (including field, aerial, and satellite surveying and mapping), study, research, and monitoring activities.*

Necessary compliance coordination has been completed regarding the National Historic Preservation Act, the Wilderness Act, the Wild and Scenic Rivers Act, and the Endangered Species Act, as applicable. This project clearance is valid providing that you adhere to the conditions stipulated in the enclosed *Categorical Exclusion Form* and associated documents when implementing this project.

*//R. Kevin Cann//*  
for Michael J. Tollefson

6/15/06  
Date

Enclosure (with attachments)

cc: Statutory Compliance File

*The signed original of this document is on file at  
the Environmental Planning and Compliance  
Office in Yosemite National Park.*

## Environmental Screening Form

(Version: FEB06)

Compliance Tracking Number: 2006-068

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**Title:** Tuolumne Meadows Hydrologic Impacts Study

**Location:** Tuolumne Meadows, Tuolumne County, California

**Project Manager:** Jim Roche, Resources Management and Science, Yosemite National Park

### B. PROJECT DESCRIPTION AND BACKGROUND

The purpose of this project is to analyze the surface and ground water levels and flows, soils and vegetation to produce a preliminary summary of impacts to Tuolumne Meadows. This study is being conducted in support of the Tuolumne Wild and Scenic River and the Tuolumne Meadows Development concept planning processes. The entire meadow area will be studied with particular emphasis on impacts to hydrology due to: 1) the Tioga Road, 2) the old road through the middle of the meadow and other dirt roads, such as that out to Parson's Lodge, 3) the bridge and culverts, and 4) water diversions from the Dana Fork.

Specific tasks include mapping surface water diversions, installation of 50-100 hand-augered monitoring wells along 5 transects of the meadow, and installation of staff gages and water level loggers in the Tuolumne River (see attached site map). In addition, depth of meadow sediments will be determined using ground penetrating radar. Determination of the age structure of lodgepole pines encroaching on the meadow will be conducted in concert with the ongoing lodgepole pine removal project. Up to 100 of the removed trees or remaining stumps will be sampled. Additionally, a climate history of the area will be created through increment boring of 200 older lodgepole pines in the areas surrounding the meadows including in Wilderness. Maps of soil type and general vegetation type will be prepared as well.

The assembled data will be used to prepare a 2-dimensional conceptual and numerical model of groundwater flow. This model will allow the researchers to assess impacts of existing infrastructure on hydrologic processes and to make recommendations for future monitoring and restoration.

This project is currently funded as a 1-year project. However, wells and staff gages installed as a part of this project would be left in place for up to 4 additional years in order to monitor interannual variability in hydrology. This would allow further refinement of the conceptual and numerical groundwater models for the area.

**Table B1 – Background Information**

	Yes	No	N/A	Explanation/Notes
1. Did NPS staff conduct a site visit? If yes, list attendees. If no, explain.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Resources Management and Science staff.
2a. Is the project providing compliance for an action associated with but not covered by an approved plan? (Identify the plan and provide a section or page citation.); OR	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

- 2b. Is the project in an approved plan? (Identify the plan and provide a section or page citation.)
- 2c. Is the project consistent with that plan?
- 2d. Is the Plan's CE, FONSI, or ROD current?
- 3a. Are there any interested or affected parties?
- 3b. Has a diligent effort been made to communicate with them?
- 4a. Are there any affected agencies or tribes?
- 4b. Has consultation been completed?

**Table B2 – Environmental Screening Form Attachments (provide Attachment letter—A, B, etc.)**

	Yes	No	N/A	Explanation/Notes
1. Maps: 2 required (vicinity map & site map)	<input checked="" type="checkbox"/>			Proposed monitoring transects map; see Attachment A.
2. Drawings (e.g., design, construction)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
3. Site Plans	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
4. Photographs	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Proposed groundwater monitoring well and piezometers ; see Attachment B.
5. Non-NEPA/NHPA Approvals (Explain)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
6. Other (Explain)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

**C. ASSESSMENT OF POTENTIAL RESOURCE EFFECTS**

Are any impacts possible on the following resources?	Yes	No	N/A	Data Needed to Determine/Notes
1. Geologic resources: soils, bedrock, streambeds, etc	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Negligible; installation of monitoring wells that are 2' to 6' deep and 2" to 3" in diameter.
2. From geohazards	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
3. Air quality	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
4. Soundscapes	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
5. Water quality or quantity	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
6. Stream flow characteristics	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
7. Marine or estuarine resources	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
8. Floodplains or wetlands	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
9. Land use, including occupancy, income, values, ownership, type of use	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
10. Rare or unusual vegetation – old growth timber, riparian, alpine	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
11. Species of special concern (plant or animal; state or federal listed or proposed for listing) or their habitat	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
12. Unique ecosystems, biosphere reserves, World Heritage Sites	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Yosemite National Park is a World Heritage Site; no historic properties would be adversely affected; see Section F, the National Historic Preservation Act Checklist and attached XXX.
13. Unique or important wildlife or wildlife habitat	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
14. Unique or important fish or fish habitat	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
15. Introduce or promote non-native species (plant or animal)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
16. Recreation resources, including supply, demand, visitation, activities, etc.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
17. Visitor experience, aesthetic resources	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Negligible; the monitoring wells would be a short term visual intrusion; however visitor experience may be enhanced with information gathered on meadow habitat restoration.
18. Cultural resources including cultural landscapes, ethnographic resources	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Negligible; the assessment of effect is "No Adverse Effect;" see Section F, the National Historic Preservation Act Checklist and attached XXX.
19. Socioeconomics, including employment, occupation, income changes, tax base, infrastructure	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
20. Minority and low income populations, ethnography, size, migration patterns, etc.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
21. Energy resources	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
22. Other agency or tribal land use plans or policies	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
23. Resource, including energy, conservation potential	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
24. Urban quality, gateway communities, etc.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
25. Long-term management of resources or land/resource productivity	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The monitoring wells would assist in the long-term management of Tuolumne River water resources.
26. Other important environment resources (e.g. geothermal, paleontological resources)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

**Comments, Mitigations and Conditions:**

- None

**D. MANDATORY CRITERIA**

<b>If implemented, would the proposed action:</b>	<b>Yes</b>	<b>No</b>	<b>N/A</b>	<b>Data Needed to Determine/Notes</b>
1. Have material adverse effects on public health or safety?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
2. Have adverse effects on such unique characteristics as historic or cultural resources; park, recreation, or refuge lands; wilderness areas; wild or scenic rivers; national natural landmarks; sole or principal drinking water aquifers; prime farmlands; wetlands; floodplains; or ecologically significant or critical areas, including those listed on the National Register of Natural Landmarks?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	The assessment of effect is "No Adverse Effect;" see Section F, the National Historic Preservation Act Checklist and attached XXX.
3. Have highly controversial environmental effects?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
4. Have highly uncertain and potentially significant environmental effects or involve unique or unknown environmental risks?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
5. Establish a precedent for future action or represent a decision in principle about future actions with potentially significant environmental effects?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
6. Be directly related to other actions with individually insignificant, but cumulatively significant, environmental effects?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
7. Have adverse effects on properties listed or eligible for listing on the National Register of Historic Places?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	The assessment of effect is "No Adverse Effect;" see Section F, the National Historic Preservation Act Checklist and attached XXX.
8. Have adverse effects on species listed or proposed to be listed on the List of Endangered or Threatened Species or have adverse effects on designated Critical Habitat for these species?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
9. Require compliance with Executive Order 11988 (Floodplain Management), Executive Order 11990 (Protection of Wetlands), or the Fish and Wildlife Coordination Act?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
10. Threaten to violate a federal, state, local, or tribal law or requirement imposed for the protection of the environment?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
11. Involve unresolved conflicts concerning alternative uses of available resources (NEPA sec. 102(2)(E))?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
12. Have a disproportionate, significant adverse effect on low-income or minority populations (EO 12898)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
13. Restrict access to and ceremonial use of Indian sacred sites by Indian religious practitioners or adversely affect the physical integrity of such sacred sites (EO 130007)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
14. Contribute to the introduction, continued existence, or spread of federally listed noxious weeds (Federal Noxious Weed Control Act)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
15. Contribute to the introduction, continued existence, or spread of non-native invasive species or actions that may promote the introduction, growth or expansion of the range of non-native invasive species (EO 13112)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
16. Require a permit from a federal, state, or local agency to proceed, unless the agency from which the permit is required agrees that a CE is appropriate?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
17. Have the potential for significant impact as indicated by a federal, state, or local agency or Indian tribe?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
18. Have the potential to be controversial because of disagreement over possible environmental effects?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
19. Have the potential to violate the NPS Organic Act by impairing park resources or values?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

**Comments, Mitigations and Conditions:**

1. None

**E. SPECIAL STATUS SPECIES CHECKLIST**

Within the area of potential effect, are there:	Yes	No	N/A	Data Needed to Determine/Notes
1. Listed or proposed threatened or endangered species (Federal or State)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
2. Species of special concern (Federal or State)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
3. Park rare plants or vegetation?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
4. Potential habitat for any special-status species listed above?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
If "yes" to any of the above questions, a Special-Status Species Checklist must be completed and attached.				
<b>Comments, Mitigations and Conditions:</b>				
1. None				

**F. NATIONAL HISTORIC PRESERVATION ACT CHECKLIST**

Within the area of potential effect:	Yes	No	N/A	Data Needed to Determine/Notes
1. Will there be ground disturbance?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	The assessment of archeological effect is "No Effect;" see condition 1 below and the attached XXX.
2. Are there any archeological sites?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	CA-TUO-0493, 0494, 0111, 0499, 0131; the assessment of archeological effect is "No Effect;" see condition 1 below and the attached XXX.
3. Are there any Native American Indian traditional cultural resources?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
4. Is the project within the boundary of an archeological or historic landscape or district?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Tuolumne Meadows Archeological District; Tuolumne Meadows Historic District.
5a. Is there a National Historic Landmark?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
5b. Is there a structure(s) on the park's <i>List of Classified Structures</i> ?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
5c. Is there a historic property with a DOE and concurrence by the SHPO or a completed National Register form?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
5d. Is there a cultural property requiring review under NHPA, Section 106?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Tuolumne Meadows Historic District; Soda Springs/Parsons Lodge Complex Cultural Landscape; the assessment of effect is "No Adverse Effect," see the attached XXX.
6. Would there be alteration of a structure or cultural landscape covered by 5a-d, above?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Soda Springs/Parsons Lodge Complex Cultural Landscape.
If "yes" to any of the above, then an Assessment of Effects form (YOSE-XXX) must be completed and attached.				
<b>Mitigations and Conditions:</b>				
1. Avoid placing monitoring wells in archeological sites.				
2. Place and disguise piezometers and wells for minimum visual impacts; coordinate well locations and colors before installation with the Historic Landscape Architect (Steve Torgerson, 379-1295), to blend in with the meadow vegetation.				
3. Install monitoring wells no higher than 6" and piezometers no higher than 12" above ground surface.				

**G. WILDERNESS ACT CHECKLIST**

Is the proposed project:	Yes	No	N/A	Data Needed to Determine/Notes
1. Within designated Wilderness?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Negligible; see conditions 1-7, below, and the attached Wilderness MRA.
2. Within a Potential Wilderness Addition?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
If "yes" to either of the above, then a Wilderness Minimum Requirements Analysis must be completed and attached.				
<b>Mitigations and Conditions:</b>				
1. Wells would be painted green or grey to blend in with the meadow vegetation.				
2. The top of wells would project no more than 6 inches above the ground surface. Piezometers would project no				

- more that 12 inches.
3. The staff gage would stick up above the river bank no more that necessary to provide a consistent reference elevation for measuring river stage. The gages would be painted to blend in with the surrounding area.
  4. Monitoring wells, piezometers, and staff gages would remain in place for up to 5 years and would be removed by Resources Management and Science staff. Resources Management and Science will be developing a research installations database that will track the deployment of these installations.
  5. Trees sampled for tree rings will not include isolated individuals in high visibility locations, so called "icon trees," or stressed individual trees with high exposure and little soil around the roots.
  6. A battery operated drill would be used in cases where chiseling a knot from the tree or using an increment borer is not feasible.
  7. Wedge cuts would be considered a last resort and would be approved by park staff before collection.

**H. WILD AND SCENIC RIVERS ACT CHECKLIST**

Does the proposed project:	Yes	No	N/A	Data Needed to Determine/Notes
1. Fall within a wild and scenic river corridor? If "yes", name the river(s)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Tuolumne River
2. Fall within the bed and banks AND affect the free-flow of the river?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
3. Potentially affect water quality of the area?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
4. Remain consistent with its river segment classification?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	A river management plan has not been completed for the Tuolumne River; therefore no segment classifications have been established. This research and monitoring would be consistent with any classification: "Wild," "Scenic," or "Recreational."
5. Protect and enhance river ORVs?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	A river management plan has not been completed for the Tuolumne River; therefore no ORVs have been determined for the river; a scientific ORV is likely; installation of monitoring wells would protect and enhance a scientific ORV.
6a. Fall within the River Protection Overlay?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	A river management plan has not been completed for the Tuolumne River; therefore no RPO has been determined for the river.
6b. If "yes", is it consistent with conditions of the River Protection Overlay?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Installation of monitoring wells would be consistent with with an RPO, should one be established for the Tuolumne River.
7. Remain consistent with the areas Management Zoning?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	A river management plan has not been completed for the Tuolumne River; therefore no management zoning has been determined for the river; installation of monitoring wells would be consistent with any management zoning.
8a. Fall on a tributary of a Wild and Scenic River?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
8b. If 9a is "yes", will the project affect the Wild and Scenic River corridor?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
8c. If 9a is "yes", will the project unreasonably diminish scenic, recreational, or fish and wildlife values?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
If "yes" to questions 2, 9b, or 9c, then a WSRA Section 7 determination must be completed and attached.				

**Mitigations and Conditions:**

1. None

**I. NEPA Analysis and Approval Conditions**

When implemented as detailed in the project description and following all Project Mitigations and Conditions listed below, this project meets the terms and conditions of a categorical exclusion to NEPA.

**Applicable Categorical Exclusion:**

DO12 3.4 E (6) - *Non-destructive data collection, inventory (including field, aerial, and satellite surveying and mapping), study, research, and monitoring activities.*

**Project Mitigations and Conditions:**

1. Avoid placing monitoring wells in archeological sites. (Resources Management and Science)
2. Place and disguise piezometers and monitoring wells for minimum visual impacts; coordinate well locations and colors before installation with the Historic Landscape Architect (Steve Torgerson, 379-1295), to blend in with the meadow vegetation. (Resources Management and Science) (Wilderness Office)
3. The top of wells would project no more than 6 inches above the ground surface. Piezometers would project no more that 12 inches above the ground surface. (Wilderness Office) (Resources Management and Sciences)
4. The staff gage would stick up above the river bank no more that necessary to provide a consistent reference elevation for measuring river stage.(Wilderness Office)
5. Monitoring wells, piezometers, and staff gages would remain in place for up to 5 years and would be removed by Resources Management and Science staff. Resources Management and Science will be developing a research installations database that will track the deployment of these installations. (Wilderness Office)
6. Trees sampled for tree rings will not include isolated individuals in high visibility locations, so called "icon trees," or stressed individual trees with high exposure and little soil around the roots. (Wilderness Office)
7. A battery operated drill would be used in cases where chiseling a knot from the tree or using an increment borer is not feasible. (Wilderness Office)
8. Wedge cuts would be considered a last resort and would be approved by the park Wilderness Specialist (Mark Fincher, 372-0219) before collection. (Wilderness Office)

*This project has been reviewed in accordance with the above criteria and it has been determined that the project will result in no or minimal environmental effects. Therefore, it is categorically excluded from further environmental review required under the National Environmental Policy Act. Additionally, the necessary compliance coordination has been completed with regard to the National Historic Preservation Act, the Wilderness Act, the Wild and Scenic Rivers Act, and the Endangered Species Act.*

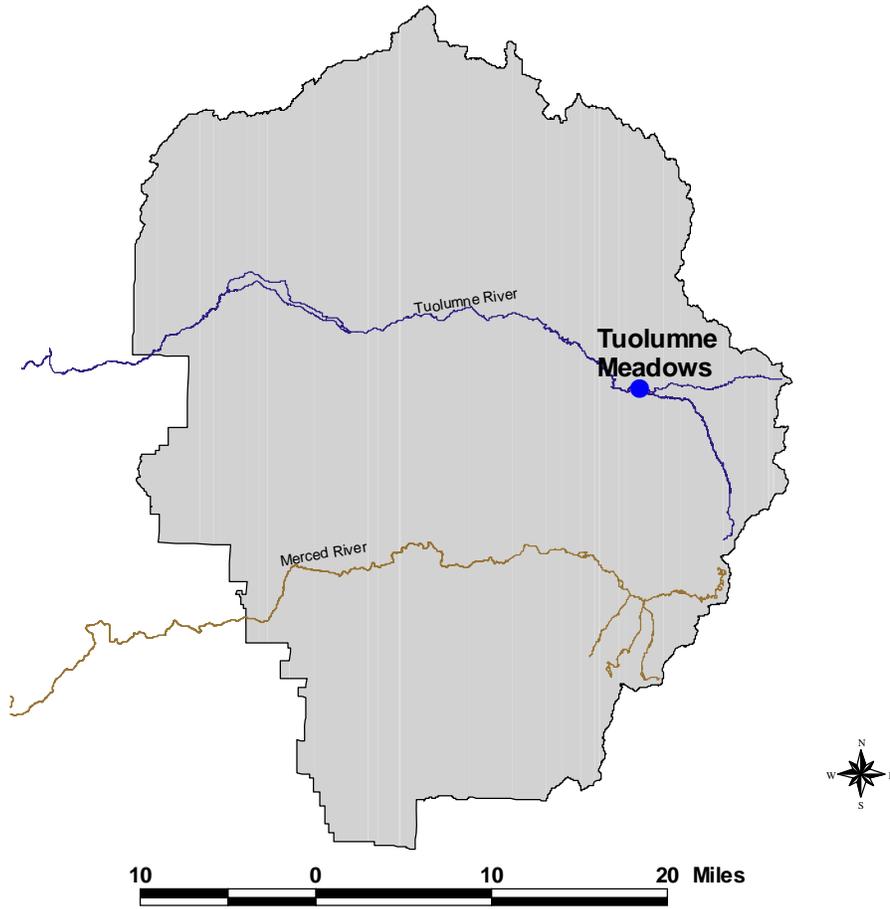
*G. Colliver* *6/12/06*  
\_\_\_\_\_  
**Compliance Specialist** **Date**

*Mark A. Butler* *6/14/06*  
\_\_\_\_\_  
**Compliance Program Manager** **Date**

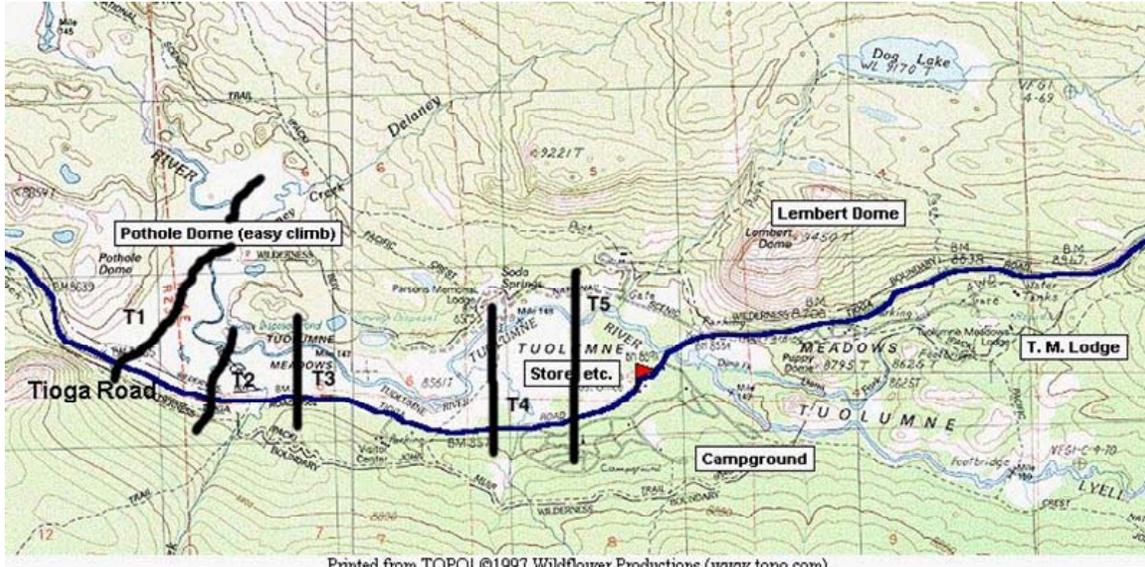
*Larry Harris for* *6/14/06*  
\_\_\_\_\_  
**Chief, Project Management** **Date**

*The signed original of this document is on file at the Environmental Planning and Compliance Office in Yosemite National Park.*

### Attachment A



Map 1 Yosemite National Park, showing location of Tuolumne Meadows



Printed from TOPO! ©1997 Wildflower Productions (www.topo.com)

Map 2 Tuolumne Meadows, showing Monitoring Transects

## Attachment B



**Photo 1 Groundwater monitoring well (2-inch PVC) and piezometer (1/2-inch PVC) installed in Crane Flat meado**

## Preservation Assessment Form (YOSE XXX)

(Version: FEB06)

Compliance Tracking Number: 2006-068

PEPC Project Number: 15889

### A. DESCRIPTION OF UNDERTAKING

**Title:** Tuolumne Meadows, Impacts Study, Effects of Hydrologic Alterations on Tuolumne Meadows

**Project Location and Area of Potential Effect:**

Tuolumne Meadows, Tuolumne County, California

**Project Manager:** Jim Roche, Resources Management Science, Yosemite National Park

**Project Description:** The purpose of this project is to analyze the surface and ground water levels and flows, soils and vegetation to produce a preliminary summary of impacts to Tuolumne Meadows. This study is being conducted in support of the Tuolumne Wild and Scenic River and the Tuolumne Meadows concept planning processes. The entire meadow area will be studied with particular emphasis on impacts to hydrology due to: 1) the Tioga Road, 2) the old road through the middle of the meadow and other dirt roads, such as that out to Parson's Lodge, 3) the bridge and culverts, and 4) water diversions from the Dana Fork. Specific tasks include mapping surface water diversions, installation of 50-100 hand-augered monitoring wells along 5 transects of the meadow, and installation of staff gages and water level loggers in the Tuolumne River (see attached site map). In addition, depth of meadow sediments will be determined using ground penetrating radar. Determination of the age structure of lodgepole pines encroaching on the meadow will be conducted in concert with the ongoing lodgepole pine removal project. Up to 100 of the removed trees or remaining stumps will be sampled. Additionally, a climate history of the area will be created through increment boring of 200 older lodgepole pines in the areas surrounding the meadows including in Wilderness. Maps of soil type and general vegetation type will be prepared as well. The assembled data will be used to prepare a 2-dimensional conceptual and numerical model of groundwater flow. This model will allow the researchers to assess impacts of existing infrastructure on hydrologic processes and to make recommendations for future monitoring and restoration. This project is currently funded as a 1-year project. However, wells and staff gages installed as a part of this project would be left in place for up to 4 additional years in order to monitor inter-annual variability in hydrology. This would allow further refinement of the conceptual and numerical groundwater models for the area.

1. Attached Sensitive Information**	Yes	No	Explanation/Source/Notes
a. Maps	<input checked="" type="checkbox"/>	<input type="checkbox"/>	CR GIS
b. Drawings	<input type="checkbox"/>	<input type="checkbox"/>	
c. Site Plans	<input type="checkbox"/>	<input type="checkbox"/>	
d. Photographs	<input type="checkbox"/>	<input type="checkbox"/>	
e. Sample	<input type="checkbox"/>	<input type="checkbox"/>	
f. List of Materials	<input type="checkbox"/>	<input type="checkbox"/>	
g. Other (Explain)	<input type="checkbox"/>	<input type="checkbox"/>	

\*\* Sensitive documents not for duplication or distribution beyond park management, subject matter experts, and the project statutory compliance file.

**B. DESCRIPTION OF EFFECTS**

	Yes	No	N/A	Explanation/Notes
<b>1. Has the Area of Potential Effect been surveyed to identify historic properties?</b> If Yes, provide reference for the Survey (s).	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Tuolumne Meadows Archaeological District Soda Springs/Parsons Lodge Complex CLI in preparation. Additional archaeological survey records in Archeology Office.
a. Would the proposed action affect a known historic property?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Ground disturbance and visual.

2. List all Historic Properties in the Area of Potential Effect:	Affected?		Explanation/Notes
	Yes	No	
a. Soda Springs/Parsons Lodge Complex Cultural Landscape	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
b.	<input type="checkbox"/>	<input type="checkbox"/>	
c.	<input type="checkbox"/>	<input type="checkbox"/>	

3. List resources in the Area of Potential Effect to which American Indians attach cultural and religious significance:	Affected?		Explanation/Notes
	Yes	No	
a. Tuolumne Meadows	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Known to have cultural and religious significance to American Indians; resources are currently unsurveyed and undocumented.
b.	<input type="checkbox"/>	<input type="checkbox"/>	
c.	<input type="checkbox"/>	<input type="checkbox"/>	

4. The proposed action will:	Yes	No	N/A	Explanation/Note
• Destroy, remove, or alter features or elements from a historic structure	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
• Replace historic features/elements in kind	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
• Add nonhistoric features/elements to a historic structure	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
• Alter or remove features/elements of a historic setting or environment (including terrain)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Monitoring wells will have a visual impact.
• Add nonhistoric features/elements (including visual, audible, or atmospheric) to a historic setting or cultural landscape	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Monitoring wells will introduce nonhistoric elements to the CLI.
• Disturb, destroy, or make archeological resources inaccessible, or alter associated terrain	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Potential to disturb archaeological deposits.
• Disturb, destroy, or make ethnographic resources inaccessible, or alter associated terrain	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
• Begin or contribute to the deterioration of historic fabric, terrain, setting, landscape elements, or archeological or ethnographic resources	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Monitoring wells are temporary.
• Involve a real property transaction affecting historic cultural properties (i.e., the exchange, sale, or lease of land or structures)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
• Potentially affect presently unidentified historic resources	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Potential
• Other	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

5. Describe any measures that are incorporated as part of this project that will be taken to prevent or minimize loss or impairment of prehistoric or historic fabric, setting, integrity, or data:

Checklist prepared by: Jeannette Simons

Date: 7/13/06

Title: Historic Preservation Officer

**C. SPECIALIST SECTION**

**Specialists:** Your comments here (or attached) show that you have reviewed this proposal for conformity with requirements of *National Historic Preservation Act, Section 106*; with the 1995 *Service-wide Programmatic Agreement* (if applicable); with applicable parts of the *Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation*; with the *NPS Management Policies* and *Cultural Resource Management Guideline*; and have given your best professional advice about this project and the issues relevant to the Section 106 process, including identification and evaluation of historic properties and further consultation needs.

---

**Archeologist**

Name: **Laura Kirn**

Date: 6/5/06

Comments:

Ground Disturbance Involved      Yes:       No:

Assessment of Effect: **"No Effect"**

Recommended Conditions: Avoid placing monitoring wells in archeological site areas

Signature of Archeologist: //Laura Kirn// (signed original on file)

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**Cultural Anthropologist**

Name: **Sonny Montague**

Date:

Comments:

Assessment of Effect:

Recommended Conditions:

Signature of Cultural Anthropologist: \_\_\_\_\_

---

**Curator**

Name: **Jonathan Bayless**

Date:

Comments:

Assessment of Effect:

Recommended Conditions:

Signature of Curator: \_\_\_\_\_

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**Historian** Name: **Charles Palmer** Date: 6/6/06

Comments:

Assessment of Effect: **"No Adverse Effect"**

Recommended Conditions: Follow stipulations by archeologist, historic architect and landscape architect

Signature of Historian: //Charles Palmer// (signed original on file)

---

**Historic Architect** Name: **Sueann Brown** Date: 6/7/06

Comments:

Assessment of Effect: **"No Adverse Effect"**

Recommended Conditions: See HLA conditions.

Signature of Historic Architect: //Sueann Brown// (signed original on file)

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**Historic Landscape Architect** Name: **Steven Torgerson** Date: 6/7/06

Comments:

Assessment of Effect: **"No Adverse Effect"**

Recommended Conditions: Place and disguise piezometers and wells so that the views of the meadows are minimally impacted. Well height should not exceed 6", and shall be painted to match the immediate surrounding landscape. Staff gage locations and colors shall be confirmed by the HLA prior to installation. Piezometers shall not exceed 12" in height.

Signature of Historic Landscape Architect: //Steven Torgerson// (signed original on file)

**Preservation Specialist**

Name: **Doug Martin**

Date:

Comments:

Assessment of Effect:

Recommended Conditions: Recommended Conditions

Signature of Preservation Specialist: \_\_\_\_\_

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**Native American Liaison**

Name: **Jeannette Simons**

Date:

Comments:

Assessment of Effect:

Recommended Conditions:

Signature of Native American Liaison: \_\_\_\_\_

**D. RESOURCES MANAGEMENT AND SCIENCE DIVISION AND PARK 106  
COORDINATOR REVIEWS AND RECOMMENDATIONS**

- 1. Review by specialists:** The appropriate subject-matter experts have reviewed the project and entered their comments and recommendations in Section C, above.

*The foregoing assessment is adequate: the proposed action is consistent with all applicable NPS management policies, standards, guidelines, or US DOI standards and guidelines, Rehabilitation of Historic Buildings, or others, and incorporates measures to avoid Adverse Effects.*

**Reviewed and Accepted by:**

**Signature:** //Judi Weaser//  
Acting for Chief of Resources Management & Science Division

**Date:** 6/08/06

**2. Assessment of Effects: No Adverse Effect**

- 3. Compliance Requirements:** The following is the park's assessment of Section 106 process needs and requirements for this undertaking.

**Standard 36 CFR Part 800 Consultation**

Consultation under 36 CFR is needed subsequent to the preparation of this form and its review by appropriate historic resource management advisors.

**Undertaking related to the 1995 NPS Programmatic Agreement**

The above action meets all conditions for a programmatic exclusion under Stipulation IV. A of the 1995 NPS programmatic agreement, and is listed in Stipulation IV. B, as:

3. Installation of Environmental Monitoring Units (such as those for water and air quality).

**Plan-Related Undertaking**

Consultation and review of the proposed undertaking were completed in the context of a plan review process, in accordance with the 1995 NPS programmatic agreement and 36 CFR Part 800.

**Undertaking Related to Another Agreement**

The proposed undertaking is covered for Section 106 purposes under a document such as a statewide agreement written in accordance with 37 CFR Part 800.7 or counterpart regulations.

**Agreement:**

**Flood-Recovery Related Undertaking**

The proposed undertaking is covered for Section 106 purposes under the letter-based agreement between the NPS, the State Historic Preservation Office, and the Council for Historic Preservation for "Highwater 97" flood repair and recovery

**Undertaking Related to the 1999 Yosemite Programmatic Agreement**

The proposed undertaking is covered for Section 106 purposes under the park's 1999 programmatic agreement for planning, design, construction, operations and maintenance; the undertaking meets the stipulations identified in Article VII.C.2.

#### 4. Project Stipulations and Conditions

Following are listed any stipulations or conditions necessary to ensure that the assessment of effects above is consistent with 36 CFR 800 criteria of effect or to mitigate potential adverse effects:

- a. Avoid archaeological site areas
- b. place piezometer to minimally impact meadow views
- c. well- height should not exceed 6"; paint to match surrounding landscape
- d. piezometer not to exceed 12" height
- e. coordinate placement and colors with HAL staff

#### Recommended by Park Section 106 Coordinator:

Name: **Jeannette Simons**

Title: **Historic Preservation Officer**

Signature: //Jeannette Simons//

Date: 6-08-06

#### E. SUPERINTENDENT'S APPROVAL

*The proposed work conforms to NPS Management Policies and NPS-28 and I approve the recommendations, stipulations, and conditions noted in Section B of this form.*

Signature of Superintendent: //R. Kevin Cann// for Michael J. Tollefson

Date: 6/05/06

*The signed original of this document is on file at  
the Environmental Planning and Compliance  
Office in Yosemite National Park.*

## **Minimum Requirements Analysis for Study of Impacts to Hydrology in Tuolumne Meadows**

Dr. David Cooper of Colorado State University in cooperation with the U.S. Geological Survey and Yosemite National Park Division of Resources Management and Science proposes to characterize impacts to hydrologic function in Tuolumne Meadows (Figure 1) that may be caused by roads and trails, utility infrastructure, and surface water diversion for water supply (NPS Research Permit Application Number 27993). This study will require the installation of 50-100 monitoring wells along 5 transects throughout the meadows including up to 20 wells in designated Wilderness at the west end of the meadows (Figure 2). Where each transect crosses the Tuolumne River, a staff gage and water level-logger would be installed to monitor river stage. In addition, up to 200 trees in the area would be sampled for tree rings in order to construct a recent climate history of the area. Many of these trees would likely be located in Wilderness.

The purpose of this study is to inform the Tuolumne Wild and Scenic River and Tuolumne Meadows Development Concept planning efforts. As the only segment of the Tuolumne River accessible by road above Hetch Hetchy, Tuolumne Meadows is surrounded by considerable infrastructure supporting a large numbers of visitors each summer and fall. As one of the largest subalpine meadows in the Sierra Nevada, it is also one of the most significant segments of the Tuolumne Wild and Scenic River. It has long been suspected that some infrastructure has been negatively impacting the health of Tuolumne Meadow and before further planning for the area can take place, an assessment of these potential impacts is necessary.

### **Step 1**

#### **Determine whether the proposed action takes place in designated Wilderness.**

Under Alternative B, up to 20 wells would be installed in Wilderness at the west end of Tuolumne Meadows along transects T1 and T2 (Figure 2). A staff gage and water level logger would be installed in the Tuolumne River along transect T1. Up to 200 trees in Wilderness would be cored.

### **Step 2**

#### **Determine whether the proposed action is required for the administration of the Yosemite Wilderness.**

The standard that must be met for the proposed action is contained in the National Park Service Reference Manual for the administration of Wilderness (RM 41) which states the following:

Research and monitoring devices (e.g., video cameras, data loggers, meteorological stations) may be installed and operated in wilderness if: (1) the desired information is **essential for the administration and preservation of wilderness** and cannot be obtained from a location outside of wilderness without significant loss of precision and applicability, and (2) the proposed device is the minimum requirement necessary to accomplish the research objective safely.

Additionally, the Yosemite Wilderness Plan states:

Wilderness resources will also be monitored to provide an information base for determining trends and to insure that impacts are managed appropriately.

The proposed action would permit study and characterization of Tuolumne Meadows hydrology and identify impacts to hydrology and soils that affect the health of the meadows. A significant portion of Tuolumne Meadows is in designated Wilderness and likely affected by impacts to hydrology outside of Wilderness. Transect T1 extends from the Tioga Road north across the Tuolumne River. It traverses an area

of meadow that may be impacted by the road to an area on the north side of the river that may be in a more or less intact condition. Therefore, the north part of the transect could serve as a reference condition with which to compare more impacted portions of the meadow, Wilderness and non-Wilderness. The proposed action meets the requirement for administration and preservation of Wilderness by informing management actions that could potentially protect meadow function in the Wilderness portion of Tuolumne Meadows. Furthermore, the scientific value of intact portions of meadow described above as a reference condition meets the scientific purpose of Wilderness described in section 4b of the Wilderness Act.

### **Step 3**

#### **Determine if the objectives of the proposed action can be met with actions outside of wilderness.**

The objective of this study is to characterize impacts to hydrology, soils, and vegetation of Tuolumne Meadows. A significant portion of lower Tuolumne Meadows lies in designated Wilderness. Exclusion of these areas from the study would severely limit the ability to characterize impacts to the entire meadow system. The Wilderness portion of the meadows contains areas that potentially have been impacted by hydrologic alterations as well as areas that have been minimally altered. As such, this area is important not only for quantifying the overall impacts to meadow function but also potentially as a reference to compare with degraded portions of the meadow.

Tree ring analysis is necessary both to reconstruct a recent (100+ year) climate history and to identify areas and timing of changes in growth pattern or meadow encroachment. Trees would be sampled along the aforementioned transects, largely in non-Wilderness. In order to construct a complete climate history of the area as well as tease apart climatic versus anthropogenic changes in growth patterns, trees must also be sampled away from the meadow and the influence of modern and historic infrastructure. This requirement necessitates sampling trees in designated Wilderness immediately surrounding Tuolumne Meadows.

### **Step 4**

#### **Develop a list of alternatives to meet the objective of the proposed action. Include ways to reduce or mitigate the impacts of each alternative.**

##### **Alternative A, No Action.**

The wells and river gage would not be installed and trees would not be cored in Wilderness. The remainder of the study outside of wilderness would still take place.

##### **Alternative B. Install up to 20 wells and core up to 200 trees in Wilderness.**

Wells would be installed in Wilderness along Transects T1 and T2 (Figure 2). Wells would be hand-augered or pounded into the ground to a depth of approximately 2 meters. Wells would be constructed of 2-inch PVC pipe or 1-inch galvanized steel pipe. Wells would project no more than 6 inches above the ground surface and be painted to blend in with the surrounding vegetation. Piezometers would project up to 12 inches above the ground surface and be similarly painted. Figure 3 shows an example of wells installed in Crane Flat Meadow in Yosemite National Park.

A staff gage consisting of either a metal fence post or rebar rod would be installed at the river's edge along transect T1 in order to provide a fixed point to reference river levels. The staff gage would consist of either a metal fence post or long piece of rebar anchored to the channel bottom at the river's edge. A pressure transducer would be placed in the channel to record river levels. The pressure transducer is about 4 inches

long by 1 inch in diameter. It would be placed inside a short section of PVC to protect it and attached to the staff gage.

In order to construct a climate history of the area, up to 200 trees would be sampled for tree rings and as mentioned in Step 3, many of these trees would be in Wilderness. Live trees would be sampled with an increment bore (3/8 inch diameter). Difficulties sampling dead trees with an increment bore may necessitate the use of a dry-wood bore (1/2 inch diameter) and a battery operated drill. The hardness of dry wood necessitates a high speed coring bit, something that is currently only obtainable using a motorized drill. Another possible sampling method would be removal of a knot from the dead tree using a hammer and chisel. If removal of a knot or dry-wood bore is not feasible and the individual tree is deemed essential for the study, a wedge cut would be collected. A wedge from the roots or fallen branches would be the first choice in this case due to the ability to hide these cuts easily. Only as a last resort, would a wedge cut in a standing dead tree be taken. The latter would occur only if a tree is deemed essential to the understanding of the overall climatic history and proper consultation with Resources Management and Science and Wilderness Management personnel has taken place. Exact locations of trees to be sampled is not possible to determine until the researchers have scoped the project area. A study plan and locations of trees to be sampled will be submitted to and approved by the NPS Project lead prior to tree coring.

#### Mitigations:

- Wells would be painted green or grey to blend in with the meadow vegetation.
- The top of wells would project no more than 6 inches above the ground surface. Piezometers would project no more than 12 inches.
- The staff gage would stick up above the river bank no more than necessary to provide a consistent reference elevation for measuring river stage. The gage would be painted to blend in with the surrounding area.
- Wells would remain in place for up to 5 years and would be removed by Resource Management and Science staff. Staff gage would remain in place for up to 5 years. Resources Management and Science will be developing a research installations database that will track the deployment of these installations.
- Trees sampled for tree rings will not include isolated individuals in high visibility locations, so called "icon trees", or stressed individual trees with high exposure and little soil around the roots.
- A battery operated drill would be used in cases where chiseling a knot from the tree or using an increment borer is not feasible.
- Wedge cuts would be considered a last resort and would be approved by park staff before collection.

**Step 5**

**Determine the effects of each alternative on wilderness, health, and character. Include cumulative effects.**

<b>Alternative</b>	<b>Biophysical Effects</b>	<b>Experiential Effects</b>	<b>Wilderness Character</b>
<p><b>A. No Action</b> Wells and staff gage would not be installed. Trees would not be cored. Non-Wilderness portion of the study would take place.</p>	<ul style="list-style-type: none"> <li>○ Potential continuing negative effect due to lack of information on possible impacts to Wilderness portion of Tuolumne Meadows.</li> <li>○ Tree cores would be sampled in a significantly reduced area limiting confidence in study results.</li> <li>○ No trampling and trailing due to well installation and monitoring</li> <li>○ No impacts to trees from increment boring.</li> </ul>	<ul style="list-style-type: none"> <li>○ This study has the potential to identify impacts to meadow hydrology that may be promoting the invasion of the meadow by trees. By not conducting the study in the Wilderness portion of the meadow, it may be difficult to extrapolate results that may eventually benefits this portion of the meadow.</li> </ul>	<ul style="list-style-type: none"> <li>○ None</li> </ul>
<p><b>B. Installation of 20 wells in Wilderness. Installation of river gage in Wilderness. Coring of up to 200 trees in Wilderness.</b></p>	<ul style="list-style-type: none"> <li>○ Trampling and trailing during installation.</li> <li>○ Impacts to trees from increment boring.</li> <li>○ Potential positive impact through information gained during the study that would help mitigate ongoing impacts to meadow processes.</li> </ul>	<ul style="list-style-type: none"> <li>○ This action constitutes an impact to Wilderness experience due the visibility of the well installations and river staff gage. Visibility may be mitigated somewhat by the height of meadow vegetation.</li> <li>○ Short term use of motorized equipment during collection of cores from dead trees.</li> <li>○ Visible drilled holes in dead trees.</li> <li>○ Visible saw cuts on dead trees.</li> </ul>	<ul style="list-style-type: none"> <li>○ Negative impact due to temporary installation of visible wells and possibly the river staff gage.</li> <li>○ Negative impact due to any wedge cut in a standing dead tree.</li> <li>○ Potential positive increase to untrammelled quality of meadow if study results in improvements to hydrological connections originating outside of Wilderness.</li> </ul>

**Step 6**

**Determine the management concerns of each alternative.**

Alternative	Health and Safety Concerns	Societal/Economic/Political Concerns
<p><b>A. No Action</b> Wells and staff gage would not be installed. Lodgepole pines would not be cored.</p>	<ul style="list-style-type: none"> <li>○ None</li> </ul>	<ul style="list-style-type: none"> <li>○ Negative political impact from inability to conduct a complete study of impacts to hydrology in Tuolumne Meadows.</li> </ul>
<p><b>B. Installation of 20 wells in Wilderness. Installation of river gage in Wilderness. Coring of up to 200 lodgepole pines in Wilderness.</b></p>	<ul style="list-style-type: none"> <li>○ Work in Wilderness requires careful coordination, daily safety briefings, and well-established emergency procedures.</li> <li>○ Potential tripping hazard due to camouflaged wells hidden by meadow vegetation.</li> </ul>	<ul style="list-style-type: none"> <li>○ Negative political impact resulting from visible installations in Wilderness.</li> <li>○ Negative political impact resulting from any visible wedge cuts on standing dead trees. Impacts would be short to long term depending on how long the tree remained standing.</li> <li>○ Project cost: Approximately \$120,000.</li> </ul>

## **Step 7**

### **Choose an alternative**

Alternative B, installation of up to 20 wells, a river staff gage and level logger, and coring up to 200 lodgepole pines in Wilderness, is the preferred alternative. This action meets the minimum requirements for administration of Wilderness for the following reasons:

- Data derived from this study would serve to characterize hydrologic impacts to the whole of Tuolumne Meadows including the Wilderness portion leading to better preservation of Wilderness.
- Less impacted parts of Tuolumne Meadows, largely in the Wilderness portion, serve the scientific need for reference conditions with which to compare results from other areas of the meadow.
- Impacts to Wilderness experience, while significant, are localized, temporary, and in the same viewshed as the Tioga Road thus only incrementally reducing the quality of Wilderness experience.

The installation of wells in Tuolumne Meadows will be visually obtrusive. This will be minimized to the extent possible through the mitigations outlined below. The river staff gage will be less visually obtrusive being at or below the level of the river bank. Impacts to trees cored with the increment borer are likely minimal. While the foregoing issues impact Wilderness Experience and Character, they are short-term in nature. Dry-wood bores or wedge cuts on dead trees could be visible depending on sample location and constitute a longer term impact. This impact can however to a large extent be mitigated by sampling in low use areas, hiding cuts by sampling fallen branches or shallow roots, and by sampling a part of the tree that can be hidden from view. The resulting information gained from this study, has the potential to benefit meadow health over the long term. Therefore, the benefits of this study outweigh the negative visual impacts of wells and a river staff gage and tree bores or wedge cuts in Wilderness.

A battery-operated drill would be used to obtain dry wood tree ring bores in cases where an increment borer does not suffice and it is not possible to remove a knot with hammer and chisel. Wedge cuts using hand saws are considered a greater impact to Wilderness experience and character due to the long-term visibility of the cuts. Dry wood is likely to constitute a major part of the early climate record in the area and sampling these dead trees is essential to completion of the study. Therefore, use of a battery-operated drill under the conditions outlined above is considered the minimum tool necessary to obtain this important data.

Alternative A is undesirable because only a portion of Tuolumne Meadows would be studied. The Wilderness portion of Tuolumne Meadows contains areas that may be impacted by the Tioga Road and areas that are relatively intact hydrologically. Moreover, sampling trees only in non-Wilderness portions of Tuolumne Meadows makes it difficult if not impossible to reconstruct an accurate recent climate history of the area. Taken together, conducting this investigation within the confines of non-Wilderness significantly limits the value and utility of the results.

In order to conduct the proposed work in Wilderness, Yosemite National Park Division of Resources Management and Science, the USGS, and Colorado State University shall adhere to the following mitigations:

- Wells will be painted green or grey to blend in with the meadow vegetation.
- The top of wells will project no more than 6 inches above the ground surface. Piezometers will project no more than 12 inches.
- The staff gage will stick up above the river bank no more than necessary to provide a consistent reference elevation for measuring river stage. The gage will be painted to blend in with the surrounding area.
- Wells will remain in place for up to 5 years and will be removed by Resource Management and Science staff. The staff gage would remain in place up to 5 years. Resources Management and Science

will be developing a research installations database that will track the deployment of these installations.

- Cored trees will not include isolated individuals in high visibility locations, so called “icon trees”, or stressed individual trees with high exposure and little soil around the roots.
- A battery operated drill would be used in cases where chiseling a knot from the tree or using an increment borer is not feasible.
- Wedge cuts would be considered a last resort and would be approved by park staff before collection.

**Minimum Requirements Analysis for Study of Impacts to Hydrology in Tuolumne Meadows**

Check one:

- The proposed action is a temporary, one time activity.
- The proposed action will be an on-going, long term activity.

Submitted By:

Jim Roche  
//J. Roche//

5/23/06  
5/23/06  
Date

Reviewed By:

//Niki Stephanie Nicholas//  
Division Chief, RMS  
(Attach any comments and conditions)

5/30/06  
Date

//L. Boyers//  
Wilderness Manager

6/1/06  
Date

*While I understand and support this research, I am concerned about visual intrusiveness. It will be important to remove these devices ASAP. Other concerns are addressed in mitigations.*

//Steve Shackleton//  
Chief Ranger

6/5/06  
Date

*Please include in consultation to Wilderness Manager when instrumentation is removed.*

Approved By:

//M.J. Tollefson//  
Superintendent

6/5/06  
Date

(Attach any comments and conditions)

*The signed original of this document is on file at the Environmental Planning and Compliance Office in Yosemite National Park.*

**Figure 1. Project Location Map**

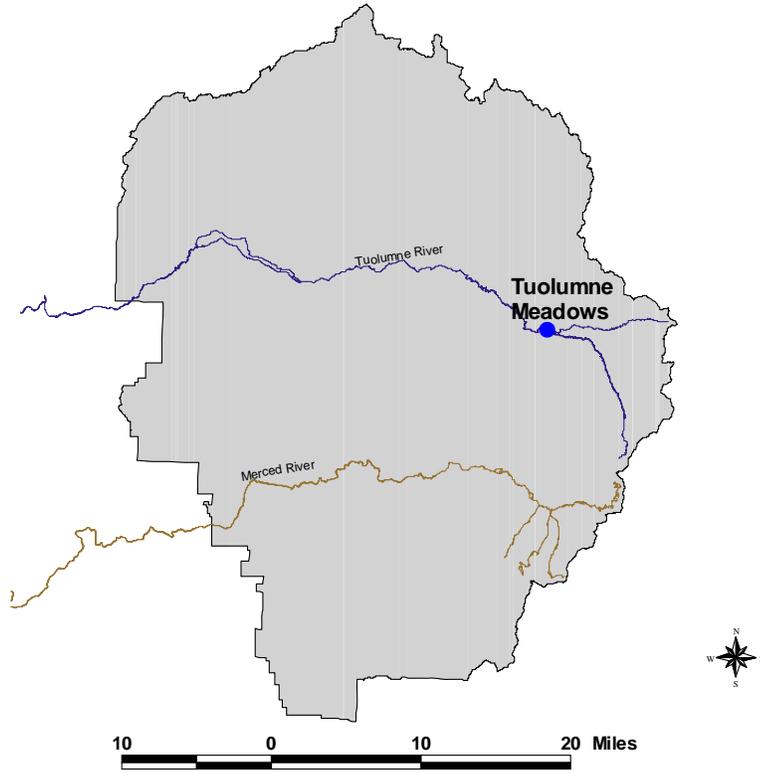


Figure 2. Site Map

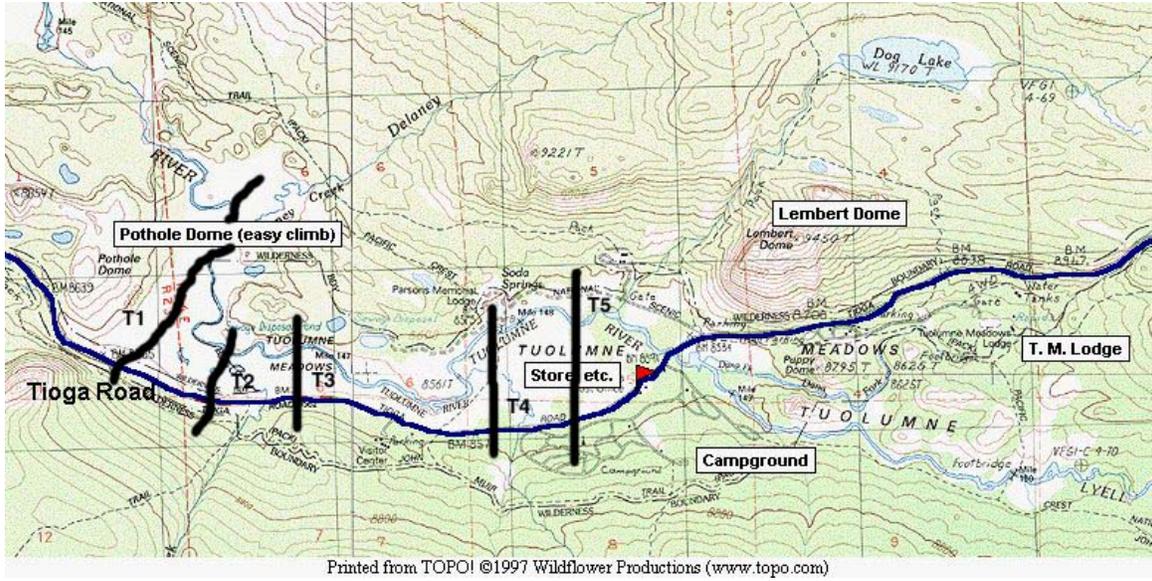


Figure 3. Well and Piezometer installation in Crane Flat Meadow. The well is 2-inch PVC and could be installed such that the top is 6 inches above the ground surface. The piezometer is ½ inch PVC the top of which should be at least 12 inches above the ground surface.

